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October 17, 1958
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OFFICE OF TECHNICAL SERVICES

U. S. Government RESEARCH REPORTS

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APPAREL

Glove characteristics influencing control manipulability, by James V. Bradley. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Aug 1957. 31p photos, graphs, tables. Order from OTS. $1.00. PB 131985

A successful methodology was developed for the objective definition and measurement of certain glove characteristics which affect the speed of operation of instrument controls by a gloved hand. Correlations were then obtained between speed of gloved operation of controls and the degree to which the gloves possessed certain characteristics. Significant positive correlations were found between speed of operation and the following characteristics: tenacity, i.e. resistance to sliding over a grasped surface (for operation of on-off controls), suppleness (for adjustable controls), and snugness of fit

for both types of control). AD 130836. Project 7182, Task 71514. AF WADC TR 57-389.

BIBLIOGRAPHY

Aerodynamic studies: The forces acting on an air vehicle, a review of the literature. Part 19, by M. Z. Krzywoblocki. Chicago. University. System Research, Chicago, Ill. Sep 1957. 169p. Order from OTS. $3.00. PB 131973

This work is an annotated bibliography of the scientific literature pertaining to methods of calculating the aerodynamic forces acting on an air vehicle in flight. The present segment of the work includes material reviewed by the author in the period July 1956 to September 1956. The more interesting papers and reports (from the viewpoint of the aerodynamicist) are discussed briefly; others are listed without comment. AD 155531. Project 7060. Covers period Jul-Sep 1956. For parts 1-4 and 16-18 see PB 131385, 131452-131456 and 131519. Contract AF 33(616)-2797. AF WADC TN 56-360, Part 19.

Bibliography and abstracts of analytical photogrammetry, by George H. Rosenfield. U.S. Army. Corps of Engineers. Engineer Research and Development Laboratories, Fort Belvoir, Va. Jul 1957. 64p. Order from LC. Mi $3.90, ph $10.80. PB 133451

This report is an annotated bibliography of English language articles and reports on the subject. It has been prepared in sheets of four 3- by 5-inch abstract cards which may be removed, cut apart, and placed in an appropriate file. This file will be brought up-to-date periodically. The abstracts are grouped according to the following headings: Adjustment of Aerial Triangulation; Analysis of the Stereo Model; Analytical Aerial Triangulation; Elements of Exterior Orientation; Fictitious Photography; Miscellaneous Computations; Theory of Errors in Photogrammetry; and Tilt Determination. DA Proj 8-35-11-106. ERDL R 1487-TR.

Bibliography of some physical phenomena in electric discharges, by G.C. Akerlof and E. Wills. Mellon Institute of Industrial Research, Pittsburgh, Pa. Jan 1950. 224p. Order from LC. Mi $9.90, ph $34.80. PB 133169

The bibliography of some physical phenomena in electric discharges presents a collection of abstracts on this phenomenon from articles presented by various journals and magazines. Subject and author listings of the abstracts are furnished. Among the main subjects covered are air, arcs, corona, discharges, electrons, gases, hydrogen, ionization, ions, magnetic field, nitrogen, plasma, positive column, radiation, spark, and water vapor. Some of the individual subjects are ionomagnetic rotation, source of protons, discharge in oxygen, corona discharge in neon, theory of Joshi effect, electron energy in discharge through helium, conduction of flames, ionization by collision, and theory of excitation of atoms. AD 73963. Koppers Co., Inc., Industrial Fellowship no. 243-x. Contract N9 onr-83301, NR 223-064.

Bibliography on photographic film dosimetry, by Gordon H. H. Griffith. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. May 1958. 19p. Order from OTS. 75 cents. PB 151026

This report contains a bibliography of books and articles that have been published through 1957 on photographic film dosimetry. It has been divided into two parts, one for X- and gamma radiation and the other for neutrons. Brief abstract type comments are included with each reference. AD 155571. Project 7360, Task 73608. Covers work from Dec 1957-Feb 1958. AF WADC TN 58-105.

CARTOGRAPHY

Geodetic distance and azimuth computations for lines over 500 miles. U.S. Air Force. Aeronautical Chart and Information Center. Air Photographic and Charting Service, St. Louis, Mo. Aug 1957. 92p diagrs, tables. Order from OTS. $2.25. PB 131980

This is the third and final report of a series containing the results of a geodetic investigation of existing formulae suitable for computing distance and azimuth of the basic geodetic curves; the geodesic, normal section and great elliptic arc. It recommends those formulae not too complex for general use and adaptable to desk calculator and electronic digital computer. Eighteen equations were evaluated; seven for the great elliptic; seven for the geodesic and four for the normal section. The accuracy criteria for this report is set at 1:000,000 in length and one second of arc in azimuth. AFACIC TR 80.

Survey of map skills requirements, by Eugene A. Cogan, Norman E. Willmorth, and Donald C. Findlay. George Washington University. Human Resources Research Office, Washington, D.C. Sep 1957. 46p tables. Order from LC. Mi $3.30, ph $7.80. PB 132004

The objective of this study was to determine opinions on requirements in man skills and man skill applications, for personnel who have a combat duty MOS and who are serving in infantry, armor, and reconnaissance units. These requirements were determined separately for seven levels of responsibility:

battalion commander, battalion staff, company commander, platoon leader, platoon sergeant, squad leader, and squad member. In addition, differences between the three types of combat units in man skill requirements were identified. GWU HRRO TR 43.

CHEMICALS AND ALLIED PRODUCTS

Organic Chemicals

Chemistry of cross-linking of polyurethanes, by Milton Orchin, Heinz Schulze, Charles Reilly, and Margie R. Huey. Cincinnati. University. Applied Science Research Laboratory, Cincinnati, O. Jan 1958. 23p. Order from OTS. 75 cents. PB 131994

This work was begun with a study of the reactions of amines, alcohols and carboxylic acids with isocyanates and extended to reactions of isocyanates with ureas, urethanes, and other compounds with active hydrogen. Simultaneously, dissociation reactions of ureas and carbamates were investigated. After scanning several of the important reactions of polyurethane chemistry the main effort was devoted to a rate study of the reactions of substituted phenylcarbanilates with amines. In order to elucidate the mechanism of this reaction, the effect of substituents in both phenyl groups on the rate of reaction was investigated. Further study included solvent and steric effects in both amine and carbanilate , as well as the effect of temperature on the rate of reaction. Finally, a standard polymer was prepared with the intention to design a reproducible test approaching conditions of field use, so that improvements which may be due to variations of the unit group or chain length rather than crosslinking might not be overlooked. AD 151058. Project 7022, Task 70337. Thesis by Charles B. Reilley, U. of Cincinnati. Contract AF 33(616)-3612. AF WADC TR 58-100.

Density of crystalline cyclotetramethylenetetranitramine (HMX), by John B. Bryden. U.S. Naval Ordnance Test Station, China Lake, Calif. Feb 1957. 7p. Order from LC. Mi $1.80, ph $1.80. PB 132493

The crystallographic density of cyclotetramethylenetetranitramine (HMX), calculated from new values of the lattice constants, is found to be 1.919 g./cc. An experimental value of 1.89 g./cc. was obtained by flotation in a mixture of carbontetrachloride and methylene iodide. Sources of error in the experimental value are discussed. NOTS 1652. NAVORD 5398.

Heats of combustion of nitrogen containing compounds, by Miles V. Sullivan, Gordon M. Kibler, and Herschel Hunt. Purdue University. Purdue Research Foundation, Lafayette, Ind. Jul 1948. 50p photos, diagrs, tables. Order from OTS. $1.25. PB 131884

The heats of combustion were determined for eleven compounds, using essentially the method and apparatus described by Miller and Hunt in J. Phys. Chem. v. 49 p. 20 (1945). Values were obtained for the combustion of each compound at 25°C, under an initial pressure of 30 atmospheres of oxygen, by reactions producing liquid water, gaseous carbon dioxide and gaseous nitrogen. Project Squid. Contract N6ori-104, T.O. 1, NR 220-042. PUR 3.

High temperature dielectric materials. 4th interim report covering period Jan - Mar 1954, by C.P. Haber. U.S. Naval Ordnance Laboratory, Corona, Calif. Apr 1954. 12p tables. Order from LC. Mi $2.40, ph $3.30. PB 130461

Diphenylvinylsilane has been prepared, characterized, and polymerized. Preliminary results show that polymerization has taken place by the desired reaction mechanism, namely, the addition of the elements of the silicon-hydrogen bond across the vinyl unsaturation. The preparation of the perfluoromethyliodophosphines has been accomplished by the reaction of perfluoromethyl iodide with white phosphorous in a closed system at elevated temperatures. Bureau Ships project nos. 20742/53 and 10772/54. NPO 5308. NOLC R 140.

Kinetics and mechanism of the cyclization of substituted alkylnitroguanidines, by Carl Boyars. U.S. Naval Powder Factory. Research and Development Dept., Indian Head, Md. Sep 1956. 129p graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 133005

Thesis - George Washington University.
1. Guanidine, Nitro - Chemical reactions
2. NAVORD 5158 3. NPF TR 89

Kinetics of the vapor-phase photochlorination of trifluorochloroethylene, by D. L. Bunbury, J. R. Lacher, and J. D. Park. Colorado. University, Boulder, Colo. Oct 1957. 13p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133299

This report presents information on the kinetics of the photochemical addition of chlorine to chlorotrifluoroethylene. The dependency on the rate of light intensity and the partial pressure of reacting substances has been measured in the presence of oxygen. Chlorine and trifluoroethylene react spontaneously in the dark. Technical note no. 6. Contract AF18(600)-1151. AF OSR TN 57-470.

Microwave spectrum, structure and internal barrier of methyl silane, by R.W. Kilb and Louis Pierce. Harvard University. Dept. of Chemistry, Cambridge, Mass. n.d. 18p tables. Order from LC. Mi $2.40, ph $3.30. PB 130943

Date is 1956 or later. Partially supported by grant from the California Research Corporation. 1. Silane, Methyl - Spectrographic analysis 2. Silane, Methyl - Damping capacity 3. Contract AF 33(616)-3485 ori-1866, T.O. XIV

PVT relationship of methane at temperatures 0°C to 150°C, and pressures at 20 to 80 atmospheres, by H.W. Schamp, Jr., E.A. Mason, and A.C.B. Richardson. Maryland. University. Institute of Molecular Physics, College Park, Md. n.d. 21p diagrs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133291

The present paper reports work on the PVT relationships of a sample of methane which is believed to be of higher purity than that which was available for similar work in the past. Date is 1953 or later. Contract Nonr-595(02).

Reaction of thiopseudoureas with 1, 3-diamino-2, 2 bis (hydroxymethyl) propane, by L.S. Hafner and Robert Evans. U.S. Naval Powder Factory. Research and Development Dept., Indian Head, Md. Jan 1957. 23p diagr. Order from LC. Mi $2.70, ph $4.80. PB 132495

ORD Task assignment no. NPF-B2d-02-12-56, replaced by Task no. 180-835/56002/01058. Data are as of 25 July 1956. 1. Quanidines - Synthesis 2. Thiopseudoureas - Reactions 3. Propane, 1, 3-Diamino-2, 2-bis (hydroxymethyl) 4. NPF TR 95 5. NAVORD 5489

Research on the safety characteristics of normal propyl nitrate, by Adolph B. Amster, Ernest A. Hogge, and Joseph B. Levy. U.S. Naval Ordnance Laboratory, White Oak, Md. Order separate parts described below from LC, giving PB number of each part ordered.

Progress report no. 1, covering period Oct 1955-15 Mar 1956. Jun 1956. 31p diagr, graphs, tables. Mi $3.00, ph $6.30. PB 133001

The study of various factors affecting the safety hazards involved in the use of n-propyl nitrate has been carried out along the following lines: The ignition of n-propyl nitrate by the rapid compression of entrapped gas bubbles has been analyzed mathematically and studied experimentally. The detonation sensitivity as measured by the gap test has been examined. The thermal decomposition of n-propyl nitrate at temperatures up to the reflux temperature has been studied. The solubility of air in n-propyl nitrate at pressures near atmospheric has been measured. NAVORD 4309.

II: Terminal report. Mar 1957. 27p graphs, tables. Mi $2.70, ph $4.80. PB 133003

The study of various factors affecting the hazards involved in handling n-propyl nitrate (NPN) has been continued. The mathematical model for the ignition of NPN by the rapid compression of entrapped bubbles has been revised to include the concept of a thermal boundary layer within the bubble. The minimum burning pressure for NPN burning in Pyrex tubes of 3.5 mm i.d. and 6 mm i.d. has been determined and the results related to the earlier bubble compression experiments. The thermal decomposition of NPN at 100°C has been examined in the presence of various additives and the results discussed. Gas solubility studies have been continued, using nitrogen and oxygen, and the sensitivity of shock of different lots of NPN and of modified NPN has been examined. Covers work from 15 Mar-1 Jul 1956. NAVORD 4493.

Study of synthesis occurring in condensate formation in the self emulsifiable cleaner, comparison formula, by H. Chafetz and C.F. Pickett. U.S. Aberdeen Proving Ground. Development and Proof Services, Aberdeen, Md. Jun 1956. 15p. Order from LC. Mi $2.40, ph $3.30. PB 133175

The chemical composition of the simpler ethylenediamine-diacetone alcohol condensate was determined. The diethylenetriamine-diacetone alcohol condensate is composed of acetone, water and a compound which appears to be a derivative of tetrahydro-5, 7, 8-trimethyl-1, 4-diazepine. Dept. of Army project no. 503-25-005. Project no. TB4-821C, Report no. 14. APG EL R 47.

Study of the triplet state of anthracene in liquid solutions, by Robert Livingston and David W. Tanner. Minnesota. University. Dept. of Chemistry, Minneapolis, Minn. n.d. 19p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133280

The half-life of the triplet state of anthracene has been measured in several air-free solvents at ambient temperatures. AD 136669. Date is 1955 or later. Contract AF 18(600)-1485. AF OSR TN 57-680.

Thermal decomposition of butane, by Jas. Cunningham, Richard McGuire, and others. Texas. University, Austin, Tex. Dec 1957. 26p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133292

An initial series of measurements of the rate of decomposition of butane in a special flow reactor gave an order of reaction and rate constants in essential agreement with results of others, but the energy of activation found was quite low. Further experiments, using direct calibrations of the analytical apparatus and improved flow control made by two different investigators confirmed the previous results. The value of the energy of activation found is about

12,000 cal/mole less than that established by others. AD 148089. AF OSR Chem 50-18. Technical note no. 1. Contract AF 18(603)-142. AF OSR TN 58-49.

Plastics and Plasticizers

Change in electrical resistivity of some high polymers during isothermal polymerization, by J. A. Aukward, R. W. Warfield, and M. C. Petree. U.S. Naval Ordnance Laboratory, White Oak, Md. Nov 1956. 22p photos, graphs. Order from OTS. 75 cents. PB 131582

The isothermal polymerizations of epoxy, polyester, and styrene resins have been monitored electrically, Sample resistivity-time records at different temperatures are reported for each class of polymer. These plots suggest that relative rates of reaction could be conveniently obtained if a correlation between extent of polymerization and electrical resistivity were known for the particular resins studied. Qualitative agreement between changes in infrared absorption and changes in volume resistivity as a measure of the extent of polymerization has been obtained. NAVORD 4421.

Chemorheological study of polyurethane elastomers, by P. C. Colodny and A. V. Tobolsky. Princeton University. Frick Chemical Laboratory, Princeton, N.J. Apr 1957. 12p graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 133246

In this paper clear evidence is presented that shows the relative stability of the urethane groups compared to the substituted urea linkages and the biuret linkages. The basis of this evidence rests with stress relaxation data of rubber samples so prepared from the same linear polyester that one class of specimens contains nearly all urethane links and the other class contains half urethane and the other half both substituted urea and biuret groups. Thesis by Paul C. Colodny, Princeton University. ONR Technical report RLT-22. Contract Nonr-1858(07), NR 356-377.

Development of a bonded edge attachment which allows the use of plate glass as a structural element in aircraft canopies, by Gerald K. Partain. Narmeo, Inc., San Diego, Calif. Nov 1957. 39p photos, diagrs, table. Order from OTS. $1.00. PB 131928

This report describes the assembly, bonding and test of fiberglass-reinforced-plastic intermediate structural attachment members to plate glass assemblies of complex contour for aircraft transparent enclosures, and effectively demonstrated the feasibility of such a mounting. AD 142345. Project 1368, Task 13434. Covers work from 1 Mar-29 Nov 1957 under Contract AF 33(616)-3352, Suppl. agreement 1 (57-1191). AF WADC TR 57-768.

Impact testing of aircraft windshields by means of a dropping projectile, by B. M. Axilrod, M. S. McKinney, Pell Kangas, and George L. Pigman. U.S. Bureau of Aeronautics. Technical Development and Evaluation Center, Indianapolis, Ind. and U.S. Bureau of Standards. Aug 1949. 24p photos, diagrs, graphs (fold), tables. Order from LC. Mi $2.70, ph $4.80. PB 132693

1. Windshields, Laminated glass - Impact tests 2. U.S. National Bureau of Standards 3. CAA TDR 95

Moisture resistance and dielectric breakdown of electrical insulating materials. Final report for the period 1 Jan 1956 to 31 Jan 1957, under Contract DA 36-039-sc-64602, by John J. Chapman and Louis J. Frisco. Johns Hopkins University. Institute for Cooperative Research. Dielectrics Laboratory, Baltimore, Md. Feb 1957. 112p drawings, tables. Order from OTS. $2.50. PB 131630

The objective of this investigation is to determine the effects of moisture on the electrical and physical properties of the plastic materials of this program and to express the mathematical relations describing these effects as functions of temperature, relative humidity and time.

Non-staining vinyl compounds, by Wayne Bidstrup. U.S. Army Prosthetics Research Laboratory, Walter Reed Army Medical Center, Washington, D.C. Jan 1957. 10p diagrs, fold. graph, tables. Order from LC. Mi $1.80, ph $1.80. PB 133044

Polyvinyl films containing a mixed Geon 121 - Pliovic AO resin were investigated as a possibility for the improvement of the stain resistance of the material used in cosmetic gloves. Technical report no. 5703.

Preparation of plastic replicas and thin sections of snow, by Alfred Fuchs. U.S. Army. Corps of Engineers. Snow, Ice and Permafrost Research Establishment, Wilmette, Ill. Nov 1956. 11p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 133054

SIPRE project: 22. 1-11. Dept. of the Army project: 8-66-02-004. 1. Crystals, Snow - Plastic replicas 2. Snow - Replicas - Preparation 3. Plastics, Polyvinyl - Uses 4. SIPRE TR 41

Paints, Varnishes and Lacquers

Anti-corrosive coatings for magnesium. II: Tide level resistance, by Jack E. Cowling, Roger Freriks, and J. A. Suther. U.S. Naval Research Laboratory. Dec 1946. 55p photos, diagr, tables. Order from LC. Mi $3.60, ph $9.30. PB 132996

This study was undertaken with a view toward providing an anti-corrosive organic finishing system affording a high degree of protection for magnesium and its alloys as used in Naval aircraft. The investigation includes the evaluation of a few existing organic coatings as compared with a number of experimental compositions prepared in the laboratory. The report describes the behavior of all materials when exposed to the ocean at tide level at Miami, Florida, and the weathering. Part I issued as NRL-?-2835. NRL P 3012.

Electrical conductivity studies of metallic films, by Richard B. Belser and Walter H. Hicklin. Georgia Institute of Technology. Engineering Experiment Station, Atlanta, Ga. Dec 1957. 122p photos, diagrs, graphs, tables. Order from OTS. $2.75. PB 151023

The temperature coefficients of resistance (TCR) of films of sputtered Au, Ir, Mo, Ni, Pd, Pt, Rh, and Ta; of evaporated Zr, Ti, and Cr; and of the alloy films Pt-Au, Pt-Ir, and Pt-Ni have been measured in vacuo over the temperature range 25°C to 600°C; the film thickness range was 100 to 3000 Å. The TCR values of films of the substantially pure metals were approximately 2/3 those of the respective bulk metals whether the films were deposited on glass, Vycor, or Stupalith substrates. The departure of the conditions of growth of the film from those usual for the bulk metal, i.e., rapid cooling effects and impurities present, contributed dislocations and imperfections which reduced the TCR of the film. AD 155573. Project 7-(8-7080). Covers period 15 Nov 1956-15 Nov 1957 under Contract AF 33(616)-3870. AF WADC TR 57-660.

High temperature resistant ceramic coatings of increased long heat stability, by Karl E. Nelson, Tracy A. Willmore, and Dwight G. Bennett. Illinois. University. Dept. of Ceramic Engineering, Urbana, Ill. Dec 1955. 19p tables. Order from LC. Mi $2.40, ph $3.30. PB 133042

This final report summarizes the results of a series of tests conducted during an investigation of the effect of composition variables on the performance of ceramic coatings when subjected to a 1600°F cyclic long heat test. It was found that various frit compositions could be reformulated from UI 418 which would produce high temperature resistant ceramic coatings of increased long heat stability. The modifications in composition which produced eight ceramic coatings having improved performance are described in some detail. Particular attention has been given to the role played by the $BaO-SiO_2$ phase equilibrium diagram in controlling the refractoriness of the ceramic coatings developed during this investigation. AD 99659. Project 3066, Task 30256. Contract AF 33(616)-2307. AF WADC TR 56-139.

Production prototype extrusion-inhibiting facility, by H.E. Metcalf, E.S. Eccleston, and Earl Yim, Jr. U.S. Naval Ordnance Test Station, China Lake, Calif. Mar 1957. 43p photos, diagrs. Order from LC. Mi $3.30, ph $7.80. PB 133160

This report describes the production process developed at the Naval Ordnance Test Station for extrusion-inhibiting propellant grains. This report also documents in one place the pertinent references to the research and development effort that have gone into the design, installation, and evaluation of a 4 1/2-inch production prototype facility for extrusion-inhibiting. NOTS 1718. NAVORD 5443.

Protective ceramic coatings for titanium, by Dwight G. Bennett, W.J. Plankenhorn, and Herbert R. Toler. Illinois. University. Dept. of Ceramic Engineering, Urbana, Ill. Nov 1953. 33p photos, drawings, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133200

This final report summarizes the results of a series of tests conducted during an investigation of the effect of ceramic coatings on the physical and metallurgical changes occurring in titanium and/or its alloys when subjected to extended heating at temperatures of from 1400 to 1800°F. Ceramic coatings prepared from frits which had been vacuum melted after the initial smelting and quenching were found to be the most effective in protecting the metal against embrittlement. AD 29828. Contract AF 33 (616)-320. AF WADC TR 54-87.

Inorganic Chemicals

Absolute intensities and line-width measurements, by D. Weber. California Institute of Technology. Daniel and Florence Guggenheim Jet Propulsion Center, Pasadena, Calif. Mar 1957. 7p tables. Order from LC. Mi $1.80, ph $1.80. PB 132958

1. Nitrogen oxides - Absorption 2. Contract Nonr 220(03), NR 015-401, Technical report 23

Corrosion studies in fuming nitric acid, by Edson H. Phelps, Frederick S. Lee, and Raymond B. Robinson. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Oct 1955. 45p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133194

Tests were conducted to determine the corrosion behavior of a stainless steel alloy in red fuming nitric acid containing various amounts of hydrofluoric acid as an inhibitor. It was found that hydrofluoric acid additions to red fuming nitric acid markedly reduced the corrosion rate of the alloy. The presence of glass in the system diminishes the inhibiting effect of the hydrofluoric acid. The corrosion potential of aluminum and stainless steel electrodes was observed in fuming nitric acids with various nitrogen dioxide and water contents, and with added fluoride.

AD 90526. Project 7312, Task 73122. Covers work from Jun 1953-Apr 1954. AF WADC TR 55-109.

Fuming nitric acid decontamination equipment (U), by Murell J. Bessey and Hippocrates G. Psyras. U.S. Chemical Corps. Chemical Warfare Laboratories, Army Chemical Center, Md. Oct 1956. 47p diagrs, tables. Order from LC. Mi $3.30, ph $7.80. PB 128004

Air Force requirements for agents and equipments to decontaminate spills of fuming nitric acid are analyzed, and development work needed to obtain equipment design criteria is discussed. The results of experimental work are described, and the resulting equipment design criteria are presented. Project 4-17-06-001, 4-17-06-001-02. Covers work from Jun 1955-Mar 1956. CC CWL R 2055.

Hydrides and borohydrides of light weight elements and related compounds. Final technical report for the period Aug 1, 1956-Jul 31, 1957, under Contract Nonr-2121(02), by H.I. Schlesinger, John E. Frey, and Pietro Ceron. Chicago. University, Chicago, Ill. Aug 1957. 12p. Order from LC. Mi $2.40, ph $3.30. PB 134800

AD 137737. For earlier reports see PB 122939, 126477 and 128079. Continuation of Contract N6 ori-20, T.O. 10. 1. Borohydrides - Reactions 2. Lithium borohydrides - Chemical reactions 3. Hydrides, Metallic 4. Contract Nonr-2121(02), Final technical report.

Mechanism of chemisorption: Nitrogen on nickel. Research covering period 1 Sep 1956-1 Dec 1957, under Contract DA 11-022-ORD-2285, by P.W. Selwood. Northwestern University. Dept. of Chemistry, Evanston, Ill. Jan 1958. 17p graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 133176

The purpose of the present work was to apply the magnetic method to the problem of the supposed chemisorption of nitrogen at low temperatures. AD 137025. Contract DA 11-022-ORD-2285, Technical report no. 1.

Nitrogen oxides as rocket fuel oxidants including the theoretical performances of propellant systems employing nitrogen tetroxide, by Leland G. Cole. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Oct 1948. 48p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 134480

A theoretical evaluation of the performance parameters of rocket propulsion systems employing nitrogen oxides as rocket-fuel oxidants and an appraisal of the available physical and chemical properties have revealed that relatively high specific impulses and altitudes may be attained at moderate chamber pressures with oxidants which are capable of storage for long periods of time. This report summarizes the physical and chemical data which are available on the nitrogen oxides, N_2O, NO, N_2O_3, NO_2, N_2O_4, N_2O_5, and NO_3, and discusses the performance evaluations for the nitrogen tetroxide-hydrazine system at ten mixture ratios at a chamber pressure of 300 psia. Unclassified Dec 28, 1955. Project no. TU 2-1: Basic research on rocket propellants. CIT JPL R 9-23.

Palladium hydride. I: Thermodynamic properties of Pd_2H between 273° and 345°K, by Donald M. Nace and J.G. Aston. Pennsylvania State University. College of Chemistry and Physics, University Park, Pa. Nov 1956. 19p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133403

The 30° absorption isotherm for hydrogen dissolved in a highly active palladium black has been measured. Partial molar heats of desorption for palladium hydride have been calculated. Partial molar heats of absorption and desorption of hydrogen from palladium hydride have also been measured in an adiabatic calorimeter. These values are used to calculate the free energy and the entropy change associated with the formation of Pd_2H from the elements at 30°C. Contribution 92. Contract N6 onr-269, T.O. 3.

Studies on boron hydrides. Final technical report of investigations on water-reactive chemical compounds, by Anton B. Burg. University of Southern California, Dept. of Chemistry, Los Angeles, Calif. Jun 1957. 40p. Order from LC. Mi $3.00, ph $6.30. PB 134799

AD 138010. For earlier reports see PB 114674, 118544 and 125424. 1. Borohydrides - Reactions 2. Hydrides, Metallic 3. Borohydrides - Bonding 4. Contract N6 onr-238(I), NR 052-050

Study of compounds of the composition $Mn_2Sb_xSe_{2-x}$, by R. Heikes. Westinghouse Electric Corporation. Research Laboratories, East Pittsburgh, Pa. Oct 1953. 13p graphs. Order from LC. Mi $2.40, ph $3.30. PB 133171

A method for improving on such excellent permanent magnet materials as MnBi by (1) An increased saturation magnetization. (2) An increased Curie temperature. (3) An increase in the anisotropy constant. Contract AF 33(616)-309. AF WADC TR 53-480.

Synthesis of new inorganic molecules, by J.C. Sheldon and S.Y. Tyree. North Carolina. University, Chapel Hill, N.C. Mar 1957. 18p. Order from LC. Mi $2.40, ph $3.30. PB 133396

The one of the products of reaction between refluxing bromine and ferric phosphide which was originally believed to be P_2Br_4 has been shown to be

$TiBr_4 \cdot 2PBr_3$. The reactions of tin hydrides, alkyls, and aryls with phosphorus halides show that the hydrogen, alkyl, and aryl groups leave the tin atom for the phosphorus atom with ease, giving a complex mixture of products. Contract Nonr 855(05), NR 52-371, Annual technical report no. 1.

Thermal conductivity of fluids: Nitrogen dioxide in the liquid phase, by G.N. Richter and B.H. Sage. California Institute of Technology, Pasadena, Calif. Jul 1956. 28p photo, drawings, diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 132883

Equipment of spherical configuration was constructed for measurement of the thermal conductivity of liquids and gases at elevated temperatures and pressures. The thermal conductivity of nitrogen dioxide was studied in the temperature interval between 40° and 160°F., and at pressures from near bubble point to 5,000 pounds per square inch. The results are presented in graphical and tabular form. Technical report CIT-1-P. Ms-5094. Paper to be submitted to Industrial and Engineering Chemistry for publication during 1956. Project Squid. Contract N6 ori-105, T.O. III, NR 098-038.

Thermodynamic design of supersonic expansion nozzles and calculation of isentropic exponent for chemically reacting gases, by Rudolph Edse. Ohio State University Research Foundation, Columbus, O. Jun 1956. 37p photos, graphs, tables. Order from OTS. $1.25. PB 151024

Methods are presented for calculating differential and integral values of the isentropic exponents in gases in the presence or absence of chemical reactions. A numerical evaluation according to the new method is given for dissociating hydrogen. The results of the calculations indicate that the isentropic exponent of a chemically reacting gas mixture differs greatly from the ratio of the specific heats. This report indicates that accurate designs of supersonic expansion nozzles from chemically reacting gases require a detailed thermodynamic analysis of the system. AD 151184. Project 6(2-3058), Task 70331. Contract AF 33(616)-2833. AF WADC TR 57-485.

Toxicity of sodium borohydride, trimethyl borate, lithium borohydride, potassium fluoborate and sodium hydride, by Colborn T. Blaisdell. U.S. Chemical Corps. Medical Laboratories, Army Chemical Center, Md. Mar 1955. 12p. Order from LC. Mi $2.40, ph $3.30. PB 133282

1. Boron compounds - Toxicity 2. Sodium hydride - Toxicity 3. Lithium borohydrides - Toxicity 4. Potassium fluoborate - Toxicity 5. CC ML RR 351

Analytical Chemistry

Colorimetric determination of extracted lipids: Adaptation for microgram amounts obtained from cerumen, by S.P. Chiang, C.F. Gessert, and O.H. Lowry. U.S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Tex. Jun 1957. 5p graph, table. Order from LC. Mi $1.80, ph $1.80. PB 133285

A colorimetric method is presented, which uses the Beckman spectrophotometer for the determination of ether-soluble substances in specimens of cerumen. It is based on previous methods which made use of the color change that occurs in the oxidation-reduction reaction between organic matter and potassium dichromate in concentrated sulfuric acid. The method is adapted to measure amounts of lipid in the microgram range. AF SAM R 56-113.

Determination of carbon in inert organic explosives intermediates, by Seymour Lader. U.S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N.J. Apr 1957. 11p diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 133258

A high-frequency combustion method has been developed for the determination of carbon in inert organic compounds. These compounds are frequently used as explosive intermediates. A number of materials of known purity have been tested. A description of the method is given. PA TR 2409.

Determination of hydrogen in zirconium hydride, by Wade H. Jones. U.S. Air Force. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Dec 1957. 10p photo, table. Order from OTS. 50 cents. PB 131972

A simple, rapid, precise method for determination of hydrogen in zirconium is described. It is based on the measurement of the equilibrium pressure of hydrogen over the metal in a closed system under predetermined conditions. This report covers the analysis of thirty-five samples of zirconium hydride with temperatures ranging from 1900°C to 1000°C and collection times from 10 to 30 minutes. AD 142186. Project 7360, Task 73600. Covers work from Sep 1955-Sep 1956. AF WADC TN 57-294.

Extraction procedure for the determination of the metallic constituents in greases, by Larry A. Harrah. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. May 1958. 11p graphs, table. Order from OTS. 50 cents. PB 151027

A discussion is given of conditions required for the extraction of the metallic ions from an organic liquid soap to an aqueous phase previous to the determination of the metallic ion concentration. An analytical procedure for these ions, using the flame photometer, is proposed and evaluated. AD155522. Project 7360, Task 73601. Covers work from Aug 1957-Feb 1958. AF WADC TN 58-46.

Quantitiative analysis of the fungicide 3, 3'-difluoro 4, 4'-dihydroxybiphenyl, by Myron L. Dunton. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. 11p graphs, tables. Order from OTS. 50 cents. PB 131971

A quantitative method is described for determining the quantity of the fungicide 3, 3'-difluoro 4, 4'-dihydroxybiphenyl which has been added to white duck cloth. This method involves extraction with methanol and subsequent ultra-violet spectrophotometric measurement. It also is suggested that this method may be applied to the analysis of other related fungicides. AD 142277. Project 7360, Task 73602. Covers work from Nov 1956-Apr 1957. AF WADC TN 57-342.

Quantitative determination of fluorinated fungicidal agents in Air Force materiel, by Harry V. Drushel and Doris J. Toft. Mellon Institute, Pittsburgh, Pa. May 1958. 73p graphs, tables. Order from OTS. $2.25. PB 131993

Methods for the extraction of the fungicides 1-fluoro-3-methyl-4, 6-dinitrobenzene and 5, 5'-difluoro-2, 2'-dihydroxydiphenyl sulfide have been developed on the basis of the mechanisms of interaction between the fungicide and the treated material. Numerous methods including polarography, spectrophotometry, and colorimetry have been shown to be useful for the determination of these fungicides. Leather, however, offers considerable difficulty during analysis because of serious interference from tannins which are simultaneously extracted. Steam distillation or azeotropic distillation with organic solvents was not successful for separating the fungicide from tannins. Anion exchange chromatography was used to separate the fungicide but this technique suffers from the disadvantage of being time-consuming. Some additional methods of separation and determination which have not, as yet, been examined are discussed. The choice of any one of the analytical methods described will depend upon the nature of the material which has been treated with the fungicide. AD 155524. Project 7360, Task 73602. Covers work from Mar 1957-Mar 1958 under Contract AF 33(616)-3998. AF WADC TR 58-59.

Rapid determination of vanadium in Navy special fuel oil by X-ray fluorescence, by M. B. Cavanagh and R. M. Roe. U.S. Naval Research Laboratory. Jul 1958. 7p graphs, table. Order from OTS. 50 cents. PB 131786

A rapid method is described for the estimation of vanadium in Navy Special fuel oil utilizing x-ray fluorescence techniques. The time required for a single determination is approximately 15 minutes compared with the conventional wet analysis procedure requiring 16 to 24 hours. The use of a gas flow proportional counter and pulse-height discriminator increases the accuracy and precision of the method. NRL R 5158.

Miscellaneous Chemicals

Chemical processes as methods of achieving high temperatures, by David Altman. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Jun 1956. 24p graphs, tables. Order from OTS. 75 cents. PB 131549

A study of those chemical reactions capable of yielding very high temperatures has shown that the most critical quantity limiting high temperatures in flames is the bond energy. Chemical reactions which form only N-N and C-O bonds are capable of delivering the highest temperatures attainable by chemical means alone. Effectiveness of control of state variables is discussed in relation to the degree of dissociation of the combustion gases. Contract DA 04-495-ord-18. CIT JPL M 20-132.

Computation of thermodynamic properties of gases from their spectra, by L. Savedoff, J. Belzer, and H. L. Johnston. Ohio State University Research Foundation, Columbus, O. Dec 1948. 12p tables. Order from LC. Mi $2.40, ph $3.30. PB 130864

ATI 87933. Originally presented in a paper given before the Ohio State Symposium on Molecular Structure and Spectroscopy, Jun 15-19, 1948.
1. Gases - Thermodynamic properties
2. Gases - Spectrographic analysis 3. Contract N6 onr-225, T.O. XII, NR 058005 4. OSURF Proj 316, Report no. 1

DETERIORATION STUDIES

Compilation of data from evaluations of the fungus resistance properties of Air Force materials, by Earlana L. Hamilton. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Apr 1955. 59p tables. Order from LC. Mi $3.60, ph $9.30. PB 130491

The materials discussed fall into three general classes: (1) those employing a fungicidal treatment, (2) those without treatment, but which show a natural resistance to fungi because of their chemical com-

position which does not readily provide fungi with a source of nutrient, and (3) the chemicals or formulations that are toxic to micro-organisms. Fungistatic treatments which have proven unsatisfactory in the particular formulation tested are also listed. However, those found unsatisfactory may well prove satisfactory when used or tested under other conditions. AD 75796. Project 7312, Task 73124. AF WADC TR 56-72.

Effect of natural and accelerated weathering on luminous material, by L. H. Dawson. U.S. Naval Research Laboratory. Nov 1946. 41p photos, diagr, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 132994

The deterioration of commercial samples of phosphorescent and fluorescent material due to out-of-door exposure in sub-tropical and sub-arctic climates has been determined and compared with the deterioration caused by exposure in a salt spray accelerated weathering chamber. It was found that commercial luminous material was quite variable in its ability to withstand heat, light and moisture. Correlating factors between out-of-door exposure and exposure in the salt spray chamber are given for various samples of luminous material. NRL H 3018.

ELECTRICAL MACHINERY

Communication Equipment

Bibliography of some physical phenomena in electric discharges. See entry under Bibliography on page 205. PB 133169

Nonmetallic ferromagnetic materials and devices (frequency dependent delay line) (magnetostrictive filters) (low loss, 10mc-50mc ferrite material), by J. Walter Brouillette, Harold W. Katz, and others. General Electric Company. Defense Electronics Division, Syracuse, N.Y. Mar 1958. 60p photo, diagrs, graphs, tables. Order from OTS. $1.50. PB 151021

The work presented in this report covers the effort expended in the development of a frequency dependent delay device, the delay of which is to be linearly dependent upon frequency over a 2mc band; the development of magnetostrictive ferrite filter elements for operation over the frequency interval 50cps to 5000 cps; and the development of low loss, low signal materials for operation over the temperature range -65°C to -250°C and over a frequency interval of 0.5 mc to 30 mc. AD 151145. Project 4155, Task 41640. Contract AF 33(616)-3339. AF WADC TR 57-692.

Reciprocity inequalities, coherence time and bandwidth in signal analysis and optics, by E. Wolf. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research, New York, N.Y. Jun 1957. 23p. Order from LC. Mi $2.70, ph $4.80. PB 133063

This paper is concerned with establishing a rigorous reciprocity relation of the Heisenberg type between the coherence time and the bandwidth of polychromatic radiation. Following upon an observation of Gabor that the usual formulation of the reciprocity inequality which relates the effective duration of a signal and its effective bandwidth is unsatisfactory for signals that are intrinsically real (e.g, an electric signal) a modified version is here presented. AD 117277. Contract AF 19(604)-1717. NYU RR EM 106. AF CRC TN 57-558.

Speech data reduction: Voice communications by means of binary signals at rates under 1000 bits per second, by Caldwell P. Smith. U.S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Communications Laboratory, Bedford, Mass. May 1957. 116p photos, diagrs, graphs, table. Order from LC. Mi $6.00, ph $18.30. PB 133269

Vocoders are used for speech analysis with instrumentation that (a) reduces voice spectrum redundancy through memory storage and cross-correlation networks that detect spectral patterns of phonetic significance, and (b) reduces voice amplitude reduncancy by compressing voice amplitude to single voltage parameter. This data is combined with voice pitch data in a compatible digital message that can be generated with various analyzer devices (8-channel, 16-channel, n-channel Vocoders) and synthesized at a receiving terminal with a choice of devices using appropriate signal transformations. AD 117290. AF CRC TR 57-111.

Electronics

Analysis of half-wave magnetic amplifier circuit, by Tadashi Kikuchi. Brooklyn Polytechnic Institute. Microwave Research Institute, Brooklyn, N.Y. May 1957. 63p diagrs, graphs. Order from LC. Mi $3.90, ph $10.80. PB 133367

This report is an attempt to help cultivate a clearer insight in understanding the mechanism of amplification of several half-wave magnetic amplifier circuits utilizing materials with rectangular core characteristics. An ideal half-wave magnetic amplifier circuit is analyzed; its operation as a voltage controlled amplifier and its quick response mechanism are discussed. An important problem of the actual half-wave magnetic amplifier circuit, that is, the optimum value of the input circuit resistance for a given magnetic core reactor, is considered. The resistance controlled half-wave magnetic amplifier is analyzed under the assumption of a rectangular hysteresis loop representation of the magnetic core.

The half-wave magnetic amplifier with ac bias voltage is analyzed and its circuit behavior is discussed in detail. Contract Nonr-839(05), NR 375-216. PIB 504. PIB R 576-57.

Back-scattering cross section of circular metallic cylinders surrounded by a resistance foil, by H.J. Schmitt. Harvard University. Cruft Laboratory, Cambridge, Mass. Jun 1957. 24p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132122

Scattering of a plane wave by a circular metallic cylinder surrounded by a thin resistance foil is investigated for the case of the electric vector parallel to the axis of the cylinder and the case of the electric vector perpendicular to the axis. The scattered wave is expressed in the form of an eigenfunction expansion. The back-scattering cross section is calculated from the coefficients of this series for different radii of the metallic cylinders. Theoretical and experimental results show that the back-scattering cross section of metallic cylinders can be decreased, if the surface impedance of the resistive layer is equal to the characteristic impedance of the surrounding medium. AD 133636. Contract AF 19(604)-786. HU CL SR 11. AF CRC TN 57-591.

Back-scattering from dielectric-coated infinite cylindrical obstacles, by C.C.-H. Tang. Harvard University. Cruft Laboratory, Cambridge, Mass. Sep 1956. 93p photos, diagrs, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 128019

The back-scattering properties of an infinite conducting cylinder coated with a lossless dielectric layer of thickness comparable to a wavelength are investigated both theoretically and experimentally The method of eigenfunction expansion is used in the theoretical study. The experimental investigation utilizes the parallel-plate region technique modified to permit the application of the Doppler-shift principle, since this method will yield accurate back-scattering measurements even for obstacles of small scattering cross-sections. AD 98809. Contract AF 19(604)-786. HU CL SR 6. AF CRC TN 56-754.

Back-scattering measurements with a space-separation method, by H.J. Schmitt. Harvard University. Cruft Laboratory, Cambridge, Mass. Nov 1957. 28p photo, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 133302

A method for the experimental determination of the back-scattering cross section of arbitrarily shaped obstacles is suggested, which, in a manner analogous to the Michelson interferometer in optics, makes use of a semitransparent mirror in order to separate the incident wave and the reflected wave. A measurement set-up is described, and possible sources of error are discussed. The accuracy of measurements is investigated by comparing the measured values of the back-scattering cross section of circular metallic disks with the results obtained from the exact theory. AD 133777. Contract AF 19(604)-786. HU CL SR 14. AF CRC TN 57-959.

Binocular disparity as a coding dimension for pictorial instrument and radar displays, by Jerome Cohen. Antioch College, Yellow Springs, O. Dec 1955. 28p graphs. Order from LC. Mi $2.70, ph $4.80. PB 128135

Two experiments were done in order to determine the increments of binocular disparity angle which would result in equal discriminability of absolute depth judgments. The first experiment employed nineteen subjects who recorded depth judgments on a continuous scale, and the second employed twenty subjects who recorded their dept judgments in eleven discrete categories, Twenty-two pairs of test slides with four disparate targets on each slide were presented to the subjects in the same stereoscope in both studies. The responses were scaled by the method of the R scale transformation. Suggested angles of binocular disparity for equipment use are presented in the paper, as well as a discussion on the effects of disparity on target location on the horizontal dimension. AD 93633. Project 7186, Task 71545. Contract AF 18(600)-50. AF WADC TR 55-393.

Broadband single ridge waveguide components (1.0-4.0 Kmc/s), by Vincent C. Kapfer. U.S. Air Force. Air Research and Development Command Rome Air Development Center. General Engineering Laboratory, Griffiss Air Force Base, Rome, N.Y. Feb 1958. 29p photos, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133267

The characteristics of a series of experimental broadband components developed to operate in the 1.0-4.0 Kmc/s range are reviewed. Their electrical characteristics are described and test results are presented in tabular and graphical form in the Appendix. These components complete the development of a series of single ridged waveguide components in the 1.0-4.0 Kmc/s frequency range. AD 148561. AF RADC TR 58-10.

Calibration of the load capacitor of crystal impedance meters, by Murray H. Lipton. U.S. Signal Corps Engineering Laboratories, Fort Monmouth, N.J. Oct 1956. 18p photos, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 133051

The use of a capacitance bridge in conjuntion with an external precision capacitor provides capacitance calibration accuracies of ±0.02 uuf plus the absolute accuracy of the precision capacitor (±.1% or ±0.0 uuf, whichever is greater). Detailed operating instructions are furnished. DA task 3-24-02-07 Signal Corps task 867B. SCEL TM M 1709.

Coherent detection of sinusoidal signals in Gaussian noise, by K.S. Miller and R.I. Bernstein. Columbia University. Electronics Research Laboratories. Dept. of Electrical Engineering, New York, N.Y. Sep 1956. 41p diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 133369

An important characteristic of coherent integrators is that their effective bandwidth is inversely proportional to the duration of the integration time. If it is only known that a weak signal occurs somewhere in a given frequency range, then the number of integration channels required to cover the specified range increases as the amount of coherent integration is increased. The question arises whether it is profitable to lengthen the coherent integration period to increase the signal-to-noise ratio when doing so requires an increase in the number of integration channels. This problem is investigated analytically. Nunerical results appropriate for system design are presented as a series of graphs of missed-signal probability versus number of integration channels with initial unehanced signal-to-noise ratio and overall false alarm probability as parameters. AD 97921. CU 9-56-AF-2807-EE. Contract AF 30(635)-2807. CU ERL T-2/124. AF WADC TR 56-161.

Compensation of an error-sampled system by a multi-rate controller, by G. Kranc. Columbia University. Dept. of Electrical Engineering Electronics Research Laboratories, New York, N.Y. Jun 1956. 49p diagr, graphs, tables (1 fold). Order from LC. Mi $3.30, ph $7.80. PB 133041

A special type of multi-rate sampled-data system, i.e., a system which contains switches operating with different sampling periods, is discussed in this report. It is shown, after a brief outline of the multi-rate mathematics, how a multi-rate controller can be designed to compensate an error-sampled feedback system. AD 97823. Project 4506. CU-19-56-AF-2815-EE. Technical note 2/127. Contract AF 30(635)-2815, T.O. 3. CUN ERL TN 2/127.

Contribution to the determination of satisfactory reliability of airborne equipment, by W.W. Hohenner. U.S. Naval Air Development Center. Aeronautical Electronic and Electrical Laboratory, Johnsville, Pa. 15p graphs. Order from LC. Mi $2.40, ph $3.30. PB 127629

This publication describes an attempt to establish relationships between the complexity of equipments and the mean life to be expected at present. The number of tubes per set of electronic equipment was chosen as the parameter of complexity, and all available mean life figures on many different types of airborne electronic equipments were collected. WADC EL N-5661.

Description and performance of a highly selective crystal-controlled radio telemetry receiver, by Harold W. Zancanata and Ermond W. Moore. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Feb 1957. 81p photos, diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 133017

This receiver, covering the frequency spectrum from 215 to 245 megacycles, is unique in that a choice of two IF bandwidths is afforded by an "IF Selector" switch on the front panel. One IF amplifier has a pass-band of 500 kilocycles with an attenuation exceeding 60 db for frequencies beyond the pass-band from 500 Kilocycles to 20 megacycles each side of center frequency. The other IF amplifier has a bandwidth of 100 kilocycles with an attenuation exceeding 60 db for frequencies beyond the pass-band from 250 kilocycles to 20 megacycles each side of the center frequency. The receiver is described and the characteristics of the receiver obtained by tests are presented along with the test methods used. DA project 5B0 306011. Ordnance project TB 3-0538. APG BRL M 1058.

Development of a light valve cathode ray tube, by Robert Peterson. Wiley Electronics Co., Phoenix, Ariz. Jul 1957. 61p photos, diagrs, graphs (1 fold), tables. Order from LC. Mi $3.90, ph $10.80. PB 133423

The purpose of this project was the development of a light valve cathode ray tube utilizing a crystal exhibiting the longitudinal electro-optic effect as its active light shutter element. Included in the task was the procurement of such electro-optic materials as might be available and the measurement of their properties, with particular emphasis on the material Cu_2Cl_2. Emphasis in the design work was to be placed on high resolution (625 lines or more), high optical contrast ratio (near 100%), high light transmission, uniformity of transmission, and long operating life of the tube and its crystal. Dept. of the Army project 3-19-04-021. Signal Corps project 332A. WER 33. Contract DA 36-039-SC-72399, Final report.

Development of high-power, traveling-wave and hybrid tubes. Scientific report no. 5 covering period 15 Jul-15 Oct 1957, under Contract AF 19(604)-1957, by Marvin Chodorow and E. L. Ginzton. Stanford University. Microwave Laboratory. W.W. Hansen Laboratories of Physics, Stanford, Calif. Nov 1957. 16p photo, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 133293

Studies of differential attenuation methods have been the major project activity. It appears at present that optimum differential attenuation is obtained, in our case, with resistive strips having a dc resistance of approximately 2000 ohms. In the high-power broadband structures project, the loop-coupled structure having 24 loops appears to be the most promising. Calculations of the gain-per-section of a structure of this sort are in progress. In the

gridded-electron-gun project, much of the quarter's efforts have been devoted to the preparation of equipment which will be used in further tests. A gun is being assembled for beam tests and for studies of heat dissipation, and a low-power modulator is being built for operation of the two driver klystrons. AD 133753. Contract AF 19(604)-1924, Scientific report 5. SU ML R 451. AF CRC TN 57-796.

Diffraction in inhomogeneous media, by Bernard D. Seckler and Joseph B. Keller. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research, New York, N.Y. Nov 1957. 75p diagrs. Order from LC. Mi $4.50, ph $12.30. PB 133394

In Part I, a geometric method is given for finding the field in inhomogeneous media containing smooth convex bodies. In Part II, expressions are determined for the exact solution to various boundary value problems corresponding to the special problems of Part I. Contract DA 49-170-SC-2253. NYU RR MME-7.

Discontinuous initial value problems and asymptotic expansion of steady-state solutions, by Robert M. Lewis. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research, New York, N.Y. Nov 1957. 92p diagrs. Order from LC. Mi $5.40, ph $15.30. PB 133395

Part I considers initial value problems for symmetric hyperbolic linear differential equations. Part II considers asymptotic expansion of steady-state solutions of the first order system $Lw-g(x)e^{-i\omega t}$. Contract DA 49-170-SC-2253. NYU RR MME-8.

Electron physics of traveling-wave tube devices, by D.H. Sloan, J.R. Whinnery, and J.R. Woodyard. California. University. Division of Electrical Engineering. Electronics Research Laboratory, Berkeley, Calif. Mar 1958. 15p. Order from OTS. 50 cents. PB 131850

Work was concerned with fundamental problems on electron focusing and interaction in tubes of the traveling-wave class. The work described includes backward-wave interaction, crossed-field interaction, light-weight focusing studies, noise problems, large-signal interaction problems, high-density emitters, and unilateral attenuators using ferrites. Important conclusions from each study are given and the more detailed reports are listed. AD 15143. Project 4150 (formerly project 4156), Task 41570. Covers work from 1 Dec 1955-14 Aug 1957 under Contract AF 33(616)-3278. AF WADC TR 57-546.

Engineering design and development of high mobility television system. Final technical report under Contract DA 36-039-sc-64651. Radio Corporation of America. Surface Communications Engineering. Defense Electronic Products, Camden, N.J. May 1956. 191p photos, fold. drawings, diagrs (part. fold), graphs, tables. Order from LC. Mi $8.70, ph $30.30. PB 133024

Authorization was given RCA, under Contract DA 36-039-sc-64651, to design and develop a High Mobility Television System meeting the requirements and specifications as set forth in SCL-1563 dated 30 August 1952. DA project 3-27-08-007. Signal Corps project 21150.

Experimental investigation of Brillouin flow, by H.E. Petersen. Stanford University. Stanford Electronics Laboratories, and Microwave Laboratory, Stanford, Calif. Feb 1957. 92p diagrs (part fold), graphs, table. Order from LC. Mi $5.40, ph $15.30. PB 133037

This report presents the results of a predominantly experimental investigation of an axially-symmetric electron beam in Brillouin flow. Theoretical analyses are presented to show the behavior to be expected for various conditions. This includes work by Moster and Molnar which takes into account the effect of a finite shield opening, and the consequent non-abrupt rise in magnetic field strength. The design, construction and operational capabilities of a beam analyzer are presented. Contract DA 36-039-sc-63189. SU ERL TR 456-1.

Filtering deterministic messages from sampled data, by G. Franklin. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories, New York, N.Y. Jun 1956. 18p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 133035

This report is a review of the problem of signal estimation from sampled-data, with an extension of the main results of several previous efforts in the field to a more general case. This generalized implementation permits a simple physical interpretation of the operation of the optimum filter and a consequently simplified approach to the design of these filters. AD 97879. Project 4506. CU 20-56 AF-2815-EE. Contract AF 30(635)-2815, T.O. 3, NR 45360. CUN ERL TN 3/127. AF RADC TN 56-384.

Force on an anisotropic paramagnetic crystal in an inhomogeneous magnetic field, by W.P. Wolf. Harvard University. Gordon McKay Laboratory of Applied Physics, Cambridge, Mass. Apr 1957. 6p. Order from LC. Mi $1.80, ph $1.80. PB 132164

AD 117056. For scientific reports 2-3 and 6 see PB 125041, 126117 and 132163. 1. Crystals - Measurements 2. Crystals - Magnetic properties 3. Contract AF 19(604)-1084, Scientific report 7 4. AF CRC TN 57-362

Frequency discriminator analysis, by W. Selove. Massachusetts Institute of Technology. Research Laboratory of Electronics, Cambridge, Mass. Jan 1945. 7p diagrs, graph. Order from LC. Mi $1.80, ph $1.80. PB 133168

ATI 168404. Internal group Report 61. 1. Circuits, Discriminator

Further studies on the correlation of backscattering with atmospheric transmission, by J. A. Curcio, G. L. Knestrick, and T. H. Cosden. U.S. Naval Research Laboratory. Jun 1958. 21p photo, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 132623

Experimental work was performed during the period of September 1956 to June 1957 on the correlation of backscattering with atmospheric transmission. Measurements were made for a variety of conditions in which the meteorological range varied from less than 0.10 mile to more than 40 miles in atmospheres which were free of industrial pollution. The point spread about the curve indicates that meteorological range can be determined from the backscattered signal with an accuracy of 20 percent for all visibilities in the ranges studied. NRL R 5143.

Handbook for calculating pulsed radar and CW interference to AM communications receivers, by E.J. Brauner, R. Duffy, F. Haber, and others. Pennsylvania. University. Moore School of Electrical Engineering, Philadelphia, Pa. Jun 1956. 176p 1fold. map, diagrs, graphs (part fold), tables (1 fold). Order from LC. Mi $8.10, ph $27.30. PB 132866

This handbook has been written to fill a need for an adequate understanding of the effects of electrical interference on electronic equipment and to provide the necessary tools in useable form to evaluate and to avoid such interference. The methods given permit the calculation, measurement, or estimation of the output spectra of interference transmitters, the susceptibility of receivers to interference, the attenuation which exists between the source and receiver of interference, and the separation distance required to avoid interference. The specific treatment given is for determining the interference potentialities of amplitude modulated communications transmitters and pulse modulated radars on amplitude modulated communications receivers. Most of the information given is of value in determining the effects of interference on other equipments providing the interference power spectra and susceptibilities of such devices can be calculated, measured, or estimated. AD 97863. Contract AF 30(602)-583. PEU MSEE 56-05. AF RADC TR 56-136.

High-altitude rocket loop antennas, by Kay D. Baker. Utah. University. Upper Air Research Laboratories, Salt Lake City, Utah. Aug 1957. 63p photos, drawing, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 133387

The problem of design of a low-frequency rocket-borne antenna for transmitting 6 to 10 rf pulses from a high-altitude Aerobee rocket to several ground stations is attacked using a delta-loop antenna. The rocketborne delta-loop antenna is described, giving physical and mechanical details and reasons for choice of this antenna. AD 133803. Thesis: University of Utah. Contract AF 19(604)-2227, Scientific report 3. AF CRC TN 57-230.

Industrial preparedness study on surface-barrier transistors. 9th quarterly progress report covering period 1 Aug to 31 Oct 1956, under Contract DA 36-039-sc-46640, by J.D. McCotter and C.G. Thornton. Philco Corporation, Philadelphia, Pa. Nov 1956. 76p diagrs, graphs, (part fold), tables. Order from LC. Mi $4.50, ph $12.30. PB 128016

Philco no. H 2582. 1. Transistors, Germanium - Specifications 2. Transistors, Germanium - Electrical properties 3. Transistors, Germanium - Tests 4. Transistors, Germanium - Design 5. Contract DA 36-039-sc-46640, Ninth quarterly progress report

Industrial preparedness study on transistors and automatic machinery for their manufacture. Quarterly report no. 5 covering period 28 Mar to 28 Jun 1956, under Contract no. DA 36-039-sc-66038, by Frank M. Dukat and George Freedman. Raytheon Manufacturing Company. Receiving and Cathode Ray Tube Operations, Newton, Mass. Jul 1956. 71p photos, diagr, graph, table. Order from LC. Mi $4.50, ph $12.30. PB 127679

1. Transistors, Silicon - Fabrication 2. Transistors - Manufacturing equipment - Design 3. Contract DA 36-039-sc-66038, Quarterly report no. 5

Interaction-impedance measurement by perturbation of traveling waves, by R.P. Lagerstrom. Stanford University. Electronics Laboratories, Stanford, Calif. Feb 1957. 143p diagrs, graphs, tables. Order from LC. Mi $7.20, ph $22.80. PB 133399

Three methods of perturbing traveling waves on periodic low-wave structures are analyzed as techniques for evaluating the interaction impedance of structures suitable for traveling-wave tube and backward-wave oscillator operation. A perturbation integral relating the fields at a material perturbation to a resulting change in the propagation constant of a single mode is derived. Contract Nonr-225(24), NR 373-360. SU ERL TR 7.

Investigation of electronic equipment reliability as affected by electron tubes. Aeronautical Radio, Inc, Military Contract Dept., Washington, D.C. Mar 1955. 78p graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 133224

To provide a more factual basis for the analysis of equipment reliability and to aid in determining the performance that can be expected from particular types of equipment, ARINC has collected and analyzed data concerning military and commercial electronic equipment in current use. Index NE 110231, Subtask no. 1. Inter-base report no. 1. Contract NObsr 64508.

Investigation of the hollow spherical cathode. Part I: Emission mechanisms of hollow spherical cathodes. Part II: Development of a high level pulser, by Kenneth R. Brunn. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Apr 1957. 403p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $11.10, ph $62.10. PB 132103

If a small aperture is drilled in a hollow spherical vessel having its inner surface coated with a thermionic emitter, and an anode is placed in front of the aperture, the current-voltage-temperature-spacing characteristics are found to be fundamentally different than those of conventional cathode structures. A quantitative treatment is presented, and the experimental results for a wide variation of operating conditions are shown to agree with the theoretical characteristics. In conjunction with the experimental program on the hollow cathode, a high level pulser of rather unusual specifications was developed and built, which is capable of delivering a peak power of 6.25 megawatts into the unusually high load resistance of 10,000 ohms with pulse lengths of one to four microseconds at a repetition rate of thirty pulses per second. The complete design and description of this pulser is given, with circuit diagrams, parts list, operating and adjustment procedures. AD 117036. Contract AF 19(604)-524, Scientific report no. 10. Contract Nonr-1834(08), NR 373-162, Technical report no. 3. AF CRC TN 57-195.

Maser oscillators, by J.C. Helmer. Stanford University. Microwave Laboratory, Stanford, Calif. Sep 1956. 89p photos, diagrs, graphs. Order from LC. Mi $4.80, ph $13.80. PB 133360

This report concerns a theoretical and experimental study of novel sources of microwave power commonly referred to as the maser (microwave amplicifation by stimulated emission of radiation). A theoretical analysis of the maser oscillator is presented which starts with the quantum mechanics of the ammonia molecule and produces the differential equations governing the coefficients of the energy eigenfunctions. From these equations, two theories are derived. The properties of the maser amplifier are briefly considered. A new approach to maser construction is considered. DA project 3-99-13-022. SC project 112B. Contract DA 36-039-sc-71178. SU ML R 327.

Maximum operation junction temperature and reliability, by Joseph Mandelkorn. U.S. Signal Corps Engineering Laboratories, Fort Monmouth, N.J. Nov 1956. 12p graphs. Order from LC. Mi $2.40, ph $3.30. PB 133053

Measurements were made of the variations of characteristics with temperature of the germanium transistors and of the silicon transistors as they became available. A study was made of the trends of the variation of parameters with temperature, and this resulted in the definition of a maximum operating junction temperature (MOJT). Subsequently, a large quantity of the germanium alloy transistors were placed on life tests under conditions of multiple combinations of dissipation and ambient temperature with the objective of determining the relationship between the MOJT of these devices and their reliability at high temperatures. DA project 3-19-03-031. Signal Corps project 323A. For SCEL TM M 1823 see PB 131364. SCEL TM M1843.

Method of controlling gain and of reducing overload pulse distortion in a traveling-wave tube, by Edward E. Atkinson. U.S. Naval Research Laboratory. Jun 1958. 17p photos, diagrs, graphs. Order from OTS. 50 cents. PB 131782

A method has been developed for controlling the gain of a traveling-wave tube in order to reduce pulse distortion at what would normally be overload input powers. Static curves of overload input powers versus helix voltage were run for two commercial S-band tubes and one experimental tube. From these curves, the magnitude of the helix voltage change corresponding to a given gain change was determined. By applying a sweep voltage to the helix, the gain of the tube can be varied with time. A sensitivity-time control suitable for a radar preamplifier was constructed, consisting of a simple linear sweep circuit. NRL R 5156.

Microwave transhorizon communication. Final report part I: Transhorizon radiowave propagation over nonspherical earth, by Yoshitaka Kurihara. Cornell University. School of Electrical Engineering, Ithaca, N.Y. Dec 1954. 86p drawings, diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 132751

AD 56233. Research report EE229. 1. Radio waves - Propagation 2. Radio transmission 3. Contract AF 30(602)-682, Final report, Part I

Network synthesis for a prescribed impulse response, by Robert A. Pucel. Massachusetts Institute of Technology. Research Laboratory of

Electronics, Cambridge, Mass. Nov 1955. 36p graphs. Order from LC. Mi $3.00, ph $6.30. PB 133040

Two semigraphical methods are presented for the synthesis of a linear, finite, lumped-element network in which the desired response is prescribed in the time domain. Based on a thesis, Massachusetts Institute of Technology. Signal Corps Project 102B. Dept. of the Army project: 3-99-10-022 and 3-99-10-100. Contract DA 36-039-sc-64637. MIT RLE TR 305.

New medium for the protection of electronic equipment against shock and vibration, by Robert H. Jacobson. Armour Research Foundation, Chicago, Ill. Apr 1958. 151p photos, diagrs, graphs, tables. Order from OTS. $2.75. PB 151005

Emphasis during the project was directed toward the development of a slabular medium. A total of fifty-seven materials and combinations of materials from which such slabs can be produced were investigated. The proposed new medium consists of a multi-layer grid of 3/32-in Teflon rod embedded in a matrix of silicone rubber. High internal damping believed to be produced by friction at the Teflon-rubber interfaces, is the salient feature of the new medium. AD 151169. Project 4157, Task 41527. Covers period Apr 1956-Jul 1957. Contract AF 33 (616)-3559. AF WADC TR 57-530.

New peak VTVM for low-duty-cycle pulses, by Guy D. Johnson, Jr. U.S. Signal Corps Engineering Laboratories, Fort Monmouth, N.J. Jul 1956. 26p photo, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 133432

Signal Corps task 2224A. Dept. of the Army task 3-54-03-041. 1. Voltmeters, Diode 2. Voltmeters - Design 3. SCEL TM 1801

Nonlinear feedback systems with sampling, by E. Mishkin, M.S. Goldstein, and J.G. Truxal. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N.Y. Aug 1956. 43p diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133057

Two numerical methods of analysis of non-linear feedback control systems are developed. Several examples for both methods are given and the stability problem is discussed in the KG plane and by the root locus method. Dept. of the Army project no. 58-99-01-04. Contract DA 30-069-ord-1560. PIB R 450-55. PIB 380.

Operation and specification of transistors for direct-coupled logic circuits, by Dale P. Masher. U.S. Signal Corps Engineering Laboratories, Fort Monmouth, N.J. Nov 1956. 14p diagrs, graph. Order from LC. Mi $2.40, ph $3.30. PB 133052

The increasing size and complexity of modern computing machines has imposed very stringent requirements on the reliability of the individual components. For this reason, many designers have turned to direct-coupled transistor circuits where simplicity, low component count, and the inherent ruggedness of the transistor are counted upon to provide the requisite reliability. DA project 3-19-03-031. Signal Corps project N 323A. SCEL TM M 1840.

Operator methods in electromagnetic field theory, by A.D. Bresler and N. Marcuvitz. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N.Y. Mar 1957. 155p diagrs, tables. Order from LC. Mi $7.50 ph $24.30. PB 132060

Chapter I is Operator methods in electromagnetic field theory, Chapter I: Abstract operator formulation for the Maxwell equations, by A.D. Bresler and N. Marcuvitz. This report consists of Chapter II: "Guided modes in uniform cylindrical waveguide regions", and Appendices I-V. AD 133649. Report begins with Chapter II. Chapter I is PIB Report R-495-56, May 1956. Contract AF 19(604)-2031. PIB R 565-57. PIB 493. AF CRC TN 57-597.

Partially pinned tilt boundaries, by T. Vreeland, Jr., D.S. Wood, and D.S. Clark. California Institute of Technology. Dynamic Properties Laboratory, Pasadena, Calif. Sep 1957. 27p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132131

This report presents the results of a theoretical study of the conditions under which small angle tilt boundaries in a crystal can be moved when subjected to a stress which does not produce general slip. The dislocations in the boundary are assumed to be partially pinned by Cottrell atmospheres, intersecting substructure, or precipitates along the dislocation lines. Stress concentrations at pinned segments on a small angle boundary are discussed. A "yield condition" for motion of certain partially pinned boundaries is described in which pinned dislocations are left behind when the boundary is moved. AD 136612. Project R 335-10-6. Contract AF 18(600)-490, Technical note 3. AF OSR TN 57-624.

Preparation of standards and test procedures for printed circuits, by C.A. Dodge and S.E. Graf. Stanford Research Institute, Stanford, Calif. Mar 1958. 162p photos, diagrs, graphs, tables. Order from OTS. $3.00. PB 131983

Samples of laminated plastic materials suitable for base plates were purchased from representative manufacturers and tested. A list of the properties important to printed circuit base materials and printed circuit boards, together with lower limits for the properties, was compiled in the form of preliminary specifications and submitted to industry and to military organizations for comment. The comments received were used in modifying the

specifications to reflect the actual needs and abilities of the organizations involved. Where existing methods of testing for property values were not adequate, new test methods were developed. Methods were developed for determining the degree of deterioration in service environments. Factors affecting the reliability of printed circuits, such as the strength of the laminate-foil bond and the strength of component lead termination joints were also examined. AD 151142. Project 4151, Task 41545. Contract AF 33(616)-2762. AF WADC TR 57-325.

Quarterly progress report, by J. B. Wiesner, G. G. Harvey and H. J. Zimmermann. Massachusetts Institute of Technology. Research Laboratory of Electronics, Cambridge, Mass. Contract DA 36-039-sc-64637. S.C. project 102B. D.A. project 3-99-10-022. Order separate parts described below from LC, giving PB number of each part ordered.

43rd. Oct 1956. 143p photos, diagrs, graphs, tables. Mi $7.20, ph $22.80. PB 133419

Reviews work done during the period covered on: physical electronics, microwave gaseous discharges, microwave spectroscopy, nuclear magnetic resonance and hyperfine structure, microwave electronics, atomic beams, statistical communication theory, processing and transmission of information, transistor circuits, speech analysis, sensory replacement, communications biophysics, network synthesis, microwave theory.

44th. Jan 1957. 168p photos, diagrs, graphs. Mi $7.80, ph $25.80. PB 133418

Reviews work during the period on the subjects treated in the previous report and also on: solid state physics, stroboscopic research, frequency modulation studies, process analysis and synthesis, noise in electron devices, mechanical translation, neurophysiology, circuit theory, mathematics.

45th, for the period ending 28 Feb 1957. Apr 1957. 178p photos, diagrs, graphs, tables. Mi $8.10, ph $27.30. PB 133404

Discusses work performed during the quarter on: physical electronics, microwave gaseous discharges, solid state physics, microwave spectroscopy, nuclear magnetic resonance and hyperfine structure, microwave electronics, frequency modulation, statistical communication theory, process analysis and synthesis, transistor and diode studies, speech analysis, mechanical translation, communications biophysics, neurophysiology, circuit theory, network synthesis, microwave theory and statistical thermodynamics.

46th. Jul 1957. 182p photos, diagrs, graphs, tables. Mi $8.40, ph $28.80. PB 133417

Reviews work during the period on the subjects noted in the 43d report, also the following: solid state physics, noise in electron devices, statistical thermodynamics, mechanical translation, neurophysiology, circuit theory.

Recording techniques applied to filter theory, by C. Bradner Brown. U.S. Naval Ordnance Laboratory, White Oak, Md. Mar 1957. 17p diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 133159

A method of obtaining unusual filter characteristics is described based on the use of reversed time playback in recording systems. NAVORD 4388.

Reflection of electromagnetic waves from surfaces of complex shape. Part I: Experimental studies, by Ronold King and Tai Tsun Wu. Harvard University. Cruft Laboratory, Cambridge, Mass. Nov 1957. 97p drawings, diagrs, graphs. Order from LC. Mi $5.40, ph $15.30. PB 133303

A critical survey is made to summarize experimental research on the reflection of electromagnetic waves from surfaces of complex shape. Various methods of measuring the back-scattering cross section are examined in turn. Among these are the standing-wave-ratio method, methods that depend on the cancellation of the incident wave, and methods that separate the incident and scattered waves in space, in frequency, or in time. A more general problem is concerned with reflections in arbitrary directions from an obstacle. No general compilation of numerical values is provided, since emphasis is on the development and understanding of methods rather than on the accumulation of data. AD 133779. Contract AF 19(604)-786. HU CL SR 12. AF CRC TN 57-960.

Reliability of a redundant system which operates repetitively, by G. Weiss. U.S. Naval Ordnance Laboratory, White Oak, Md. Oct 1956. 44p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133002

This report deals with the probability distributions and moments thereof for the failure times of mechanisms which operate repetitively. It is assumed throughout that each system is composed of an arbitrary number of components operating in parallel. Several cases are treated: operation without replacement of defective components, operation with strictly periodic replacement of defective components, and operation with randomly periodic replacements. In addition the problem of assessing the cost of system operation with a strictly periodic replacement program is considered. NAVORD 4348.

Report on research and development resulting in an improved radio scanning adaptor for communication reception, by R.W. Zeek. U.S. Naval Research Laboratory. Jan 1947. 51p photos, diagrs (1 fold), graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 132999

The particular type of scanner discussed here was designed primarily as an aid for communication reception, to enable the operator to guard a portion of the r-f spectrum and to compare relative amplitudes of received signals (over a specified frequency band), their frequency separation, and general type (CW, MCW, pulse). NRL R 3046.

Research studies on electrets. Kansas. University, Lawrence, Kans. Contract DA 36-039-sc-5467. D.A. project 3-99-15-022. S.C. project 32-152 B-O. Order separate parts described below from LC, giving PB number of each part ordered.

6th quarterly progress report covering period 15 May to 15 Aug 1952, by N. Baumann, G. Feaster and others. Sep 1952. 32p diagr, graphs. Mi $3.00, ph $6.30. PB 127990

Electrically strong Plexiglas electrets have been manufactured. Experiments with five new wax mixtures have shown that a wide spread in room temperature relaxation times may be expected with different materials. The variation of relaxation times with temperature has been further demonstrated. The complicating effects of molding charges are discussed. Decay pulses in electrets have been further investigated in carnauba wax and Gelva V-7. An hypothesis of their origin is given. The effect of temperature-altered relaxation time on the decay of an unshorted electret has been investigated. The effect of scraping, humidity, and pressure on the surface charge of electrets is reported, and the results compared to existing theory. For 4th report see PB 127986.

7th quarterly progress report covering period 15 Aug - 14 Nov 1952, by G.R. Feaster, J.S. Fisher, and others. Dec 1952. 25p diagrs, graphs, table. Mi $2.70, ph $4.80. PB 127991

A method has been devised to mold a guard ring into an electret's surface during manufacture. Such a guard ring will improve the accuracy of measurements. Tests of both old and new substances were carried out. Cooling and/or heating curves were run on polarized and nonpolarized samples of two good electret materials, carnauba wax and Gelva V-7, in a search for differences in their phase transitions which might be induced in the polarized material. It was found that the melting point of polarized carnaube wax is about 0.8°C. higher than the melting point of the unpolarized material. Electrical noise pulses which occur in decaying electrets were measured with a ten-channel discriminator to obtain the over-all distribution of pulse sizes, the distribution of pulse sizes with the temperature and surface charge of the electrets, and to compute the total charge represented by the decay pulses. A photomicrographic study of electrets has been made.

8th quarterly progress report covering period 15 Nov 1952 to 15 Feb 1953, by G.R. Feaster, J.S. Fisher and others. Mar 1953. 28p diagr diagrs, graphs. Mi $2.70, ph $4.80. PB 127992

Initial tests indicate that, in accordance with theory, electrets manufactured and measured in vacuum have a larger heterocharge and a smaller homocharge than those prepared and measured at atmospheric pressure. Electrets have been prepared from barium titanate. Equations are derived showing that an electret having a large dielectric constant (such as $BaTiO_3$) can possess a large surface charge without interfacial breakdown occurring even at atmospheric pressure. Systematic tests of the molding charge appearing on polyvinyl acetate after the stripping of aluminum foil reveals no definite dependence of molding charge upon stripping temperature, cooling rate or molten time. The use of a silicone mold release compound lowers the surface resistivity of the specimen. A survey of the literature reveals that an electret spark has an energy of nearly the order of magnitude reportedly required for detonation of lead styphnate. An analysis of the electret microphone indicates that optimum sensitivity should occur (for ideal conditions) when the "electrical" thickness of the air gap and electret are equal.

9th quarterly progress report covering period 15 Feb to 15 Jun 1953, by G.G. Wiseman, W.R. Alexander and others. Jul 1953. 41p diagrs, graphs. Mi $3.30, ph $7.80. PB 127993

Charge measurements of a carnauba wax electret at low temperatures were made. Equations for the field conditions of an electret treated as a three-layer capacitor are presented. The heterocharge characteristics of an electret and its relation to electric field and time is expressed as a property of the dielectric called the intrinsic polarization function. A method has been devised to measured this function and results of the method are presented. Electrets of Gelva V-7 have been manufactured and measured in a vacuum of 10^{-5}mm of Hg. The minimum energy required to cause pyrolysis of lead azide has been measured for point-to-plane and ball-to-plane elec-

trode configurations. Decomposition has been initiated with a spark energy of about 10^{-3} joules using a 3 mm radius ball.

11th quarterly progress report covering period 1 Sep to 30 Nov 1953, by G. G. Wiseman, W. R. Alexander and others. Dec 1953. 47p photo, diagrs, graphs. Mi $3.30, ph $7.80. PB 127994

Attempts to form ice electrets were unsuccessful; the resistivity of the ice samples was too low. Electrets of pure sulfur, polyethylene-sulfur mixtures and mixtures of polyethlenes of widely different molecular weights have been studied. The complex dielectric constants of solid, non-polar dielectrics diluted with polar compounds are being measured over a range of temperatures. The dissectible capacitor method has been used to measure the intrinsic polarization function of carnauba wax at one temperature. The apparatus was tested using polystyrene and gave results in good quantitative agreement with the values computed. It has been demonstrated that a barium titanate electret reverses to the homocharge state in less than one second after the polarizing field has been removed. The electret forming time seems to be similarly rapid.

12th quarterly progress report covering period 1 Dec 1953 to 28 Feb 1954, by G. G. Wiseman, W. R. Alexander and others. Mar 1954. 40p diagrs, graphs. Mi $3.00, ph $6.30. PB 127995

Measurements of the complex dielectric constant of a non-polar solid, paraffin, diluted with a small quantity of polar material, ethanol, have been made at low frequencies over a range of temperatures. A plot of the values of the loss maxima versus the logarithm of the frequency at which maximum loss occurs gives a straight line. Similar measurements using other compounds were successful. The first few of a series of measurements of the intrinsic polarization function for carnauba wax and Lucite have been completed. Analytical expressions can be fitted to the experimental curves. Surface charge measurements of a ceramic $BaTiO_3$ sample both during field application and afterward do not show clear-cut evidence of a persistent volume polarization. Electrical noise pulses have been measured in ceramic $BaTiO_3$ samples after the temporary application of a polarizing field. A review of electret experiments and a survey of the literature has been made which shows the importance of homocharge-generating processes other than discharge across the gap between electrode and dielectric.

Results of UHF mutual environment test program at Rome Air Development Center, by J. Berliner and J. Augustine. U.S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss, Air Force Base, Rome, N.Y. Dec 1957. 58p photos, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 133255

Initial UHF mutual interference tests were performed to obtain interference characteristics and operational parameters of the UHF communications equipment. A determination was made of the interfering effects which occur when combinations of single-channel, UHF transmitters and receivers are operated simultaneously in close frequency and physical proximity. AD 131312. Project 4540, Task 45166. AF RADC TR 57-163.

Shock and vibration tests on the beam-switching tube, by T. B. Jackson. U.S. Naval Ordnance Laboratory. Physical Science Dept., Corona, Calif. Jun 1956. 8p graphs, table. Order from LC. Mi $1.80, ph $1.80. PB 128256

In May 1955, at the request of the Navy Bureau of Ordnance, the Instrumentation Division at the Naval Ordnance Laboratory, Corona, California, initiated a comparative study of frequency division and time division multiplexing techniques for simultaneously telemetering several channels of vibration data with frequency components ranging from 10 to 10,000 cps. NOL C TM 73-9.

Short range propagation measurements over obstructed paths at 4000 MCS, by R. C. Riehs. U.S. Signal Corps. Engineering Laboratories, Fort Monmouth, N.J. May 1957. 51p map, diagrs, graphs (part fold), tables. Order from LC. Mi $3.60, ph $9.30. PB 133430

Propagation measurements at 4000 mcs were made over a number of obstructed paths. Path lengths varied from 1 to 15 miles with various types of land and vegetative obstructions. In addition, a tropospheric propagation trial over a distance of 43 miles was attempted. Propagation measurements were directly compared with the data taken previously at 1805 and 8150 mcs, and form a consistent set of results. Dept. of the Army project 3-24-06-208. SCEL ER E 1202.

Simple theory of radiowave diffraction beyond the horizon, by H. Poeverlein. U.S. Air Force. Air Research and Development Command. Cambridge Research Center. Propagation Laboratory. Electronics Research Directorate, Bedford, Mass. Sep 1957. 18p diagrs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133278

Repeated application of Huygens' principle leads to a field-strength formula for waves diffracted around the curved earth which is identical with the approximation of the Van der Pol-Bremmer theory. The ground constants enter through the consideration

of the reflected waves, especially the reflected Huygens elementary waves. The influence of the ground can be expressed by a parameter which appears in the properly written Fresnel reflection coefficient of the ground. In order to have the diffraction theory valid, certain assumptions have to be fulfilled. Irregular inclination of the earth's surface or inhomogeneities of the atmosphere can make the theory more or less useless for the shorter wavelengths. AD 133711. Translated from Zeitschrift fllr angewandte physik, v. 8, no. 2: 90-95, 1956. AF CRC TR 57-116.

Strength and electrical transmission of three types of repairs to sandwich construction for randomes, by Bruce G. Heebink and V.P. Miniutti. U.S Forest Service. Forest Products Laboratory, Madison, Wis. May 1958. 15p diagrs, graphs, table. Order from OTS. 75 cents. PB 151022

The purpose of this technical report was to evaluate three methods for repairing damage to a typical radome sandwich construction. Tests were made to determine edgewise tensile, edgewise compressive, and flatwise tensile strength of the repaired and undamaged sections of the panels. Results showed, except for edgewise compressive strength of scarf-jointed repairs, that repair efficiency was highest when only one facing was repaired, and that no one method was superior for both one- and two-facing repairs. The results of electrical transmission tests on two of the repair methods show that the methods are electrically suitable for general radome repair. AD 155579. Project 7340, Task 73402. Covers work from Jun 1954-Jun 1957 under Contract DO 33(616)-56-9. AF WADC TR 57-609.

Subminiature special purpose electron tubes for use under severe mechanical environmental conditions, by Gerald Gross. Raytheon Manufacturing Company. Receiving and Cathode Ray Tube Operations, Newton, Mass. Dec 1953. 264p photos, drawings (part fold), diagrs, graphs, tables (part fold). Order from LC. Mi $11.10, ph $41.10. PB 133305

The purpose of this project is the development and construction of pentode special-purpose sub-miniature, and all-purpose miniature tubes for use under severe mechanical environmental conditions. DA project 3-19-01-021. SC project 302A. Covers work from 1 Jul 1954-30 Apr 1957 under Contract DA 36-039-sc-64458.

Survey and evaluation of power sources systems. Part IV: Electrical components, by Robert Fillmore, Newman A. Hall, and Thomas E. Murphy. Minnesota. University. Institute of Technology, Minneapolis, Minn. Jan 1956. 121p diagrs, graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 133422

This group of devices is concerned with the conversion of one form of electrical energy to another form of electrical energy. The devices covered are transformers, rectifiers (metallic, mechanical, electrical), inverters (mechanical) and the dynamotor. This group then consists in the main of devices for changing A.C. electric power to D.C., or D.C. to A.C., or A.C. at a given voltage to A.C. at a desired voltage, and finally D.C. at a given voltage to D.C. at a desired voltage level. DA project 3-99-09-022. SC project 162B. Covers period of work 15 Sep 1953-1 Dec 1955 under Contract DA 36-039-sc-56649.

Tactical to practical in preliminary servo-system design, by Charles F. White. U.S. Naval Research Laboratory. 14p diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 124081

Whereas servo-system design is usually accomplished in the frequency domain, the commonly specified tracking problem arises from target and interceptor flight path analysis which provides a time-function statement for automatic range and angle tracking radar servo-system inputs. A readily applied technique is presented for the preliminary design in the frequency domain of a servo system required to perform in a dynamic situation defined in the time domain. NRL R 4879.

Theory of electrochemical cell reactions. Part IV: Electrochemical cells with alkaline electrolytes (continued), by Philip A.P. Crispino, Lloyd Osipow, and Harry P. Gregor. Foster D. Snell, Inc., New York, N.Y. Apr 1956. 138p diagrs, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 133036

Chapters 12-15 of a book on Theory of Electrochemical Cells dealing with the basic chemistry and metallurgy of cadmium, iron, magnesium, and aluminum. DA project 3-99-09-022. SC project 162B. Contract DA 36-039-sc-64595.

Theory of linear electron accelerators, by E. L. Chu. Stanford University. Microwave Laboratory, Stanford, Calif. May 1951. 288p diagrs, graphs, table. Order from LC. Mi $11.10, ph $44.10. PB 133441

This work deals mainly with two basic subjects in the theory of linear electron accelerators, the accelerating field and the electron orbits. The discussion of the field problem begins with a resume of the existing theory of wave propagation inperiodic structures with particular reference to the accelerator tube, that is, a disk-loaded waveguide; then it proceeds with different methods of solution, both rigorous and approximate, including the formulation of a variational method credited to Schwinger, and with numerical results. Both the longitudinal and the transverse orbits are discussed with neglect of space charge. ATI 123095. Contract N6 onr-25116, NR 022-026. SU ML TR 140.

Transient potentials due to surface reactions on a copper electrode, by K. Yang, A.T. Ree, H. Eyring, and C.J. Christensen. Utah. University. Institute for the Study of Rate Processes, Salt Lake City, Utah. Jan 1957. 5p graphs. Order from LC. Mi $1.80, ph $1.80. PB 132478

1. Electrodes, Copper - Surface treatment 2. Electrodes - Potential 3. Contract N7 onr-45103, NR 051-192 4. UU ISRP TR 21

Transistorized-telemetering development and design criteria, by J.N. James. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. May 1957. 83p photos, diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 133038

Problems created by the application of transistors to telemetry are discussed, and the methods developed to eliminate or solve these problems are explained. Contract DA 04-495-ord-18. CIT JPL 20-108.

Tschebyscheff antenna distribution, beamwidth and gain tables, by Lawrence B. Brown and Glenn A. Scharp. U.S. Naval Ordnance Laboratory, Corona, Calif. Feb 1958. 628p tables. Order from OTS. $8.00. PB 151002

Tschebyscheff antenna distributions, beamwidths, and gain data for linear broadside arrays of isotropic radiators are given for 3 through 40 elements, and for sidelobe levels from 0 through 40 decibels for each array. The computations which were made on an electronic digital computer, are arranged in tables for ready reference. NOLC R 383. NAVORD 4629.

Ultrasonic variable delay line, by S. Gitlin. Columbia University. Electronics Research Laboratories. Dept. of Electrical Engineering, New York, N.Y. Jan 1956. 41p photos, diagrs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133370

This report deals with a device which converts electrical energy at an ultrasonic frequency to acoustic energy which then passes through a homogeneous medium, and is converted back to electrical energy. This device has been called an ultrasonic delay line since the output electrical energy contains the same information as the input energy except that it has been delayed in time. A simplified derivation of equivalent electrical circuits of a quartz transducer and a complete delay line are given. Equations are derived relating delay line input and output signals. A description is given of the laboratory model built including photographs, and results of measurements are discussed and tabulated. Calculations based on the equivalent electrical circuits are compared to actual measurements. AD 97870. CU6-56-AF-2807-EE. Contract AF 30(635)-2807. CU ERL T-1/124. AF RADC TR 56-140.

Vibration protection for electronic equipment, by Frank J. Ruther. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Electronic Components Laboratory, Wright-Patterson Air Force Base, Dayton, O. Nov 1953. 16p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 133201

General solutions are presented to the problem of protecting electronic equipment form shock and vibration, which are the end result of properly applied theoretical considerations. The system presented for protecting airborne equipment from vibration and shock is composed of three parts: (1) the immediate support structures, (2) the vibration and shock isolators, and (3) the internal structure of the equipment. Each part of the system is treated individually along with explanations of its effect on the other two. The limits to which any one of the three parts can go and still be compensated by other two are finely drawn. AD 27582. AF WADC TR 54-48.

Generators, Motors, Transmission

Study of miniature engine-generator sets. Ohio State University Research Foundation, Columbus, O. Contract AF 18(600)-192. Order separate parts described below as directed, giving PB number of each part ordered.

Part I, by Charles P. Roberts, Richard G. Salter, and Marion L. Smith. May 1953. 54p photos (1 fold), 1 fold diagr, graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 135046

The report covers work performed during the first contract year. In most cases design and test work discussed herein has not been completed, but the report discusses work in progress. AD 16911. AF WADC TR 53-180.

Part II: Investigation of engine, fuels and lubricants, by Richard G. Salter, Marion L. Smith, and Charles P. Roberts. Dec 1954. 98p photos, diagr, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 133509

Information concerning the design and performance of various types of miniature internal combustion engines is presented. Comparisons are given for the performance of miniature and larger engines with means for extrapolating large engine practice into the miniature size-range. Performance curves and design features of selected miniature test engines are presented and discussed. Desirable design features for various types of applications are given. A summary is presented of the fuel and lubricant characteristics necessary for miniature engines. AD 90155. Project

6058. Covers period from Jun 1953 - Dec 1954. AF WADC TR 53-180, Part 2.

For Parts 3 - 4 see PB 131508 - 131509.

Part V: Summary report: Feasibility, by Marion L. Smith, Owen E. Buxton, Jr., and K.Y. Tang. Oct 1956. 87p photos, diagrs, graphs, tables. Order from OTS. $2.25. PB 131974

Information is presented concerning the feasibility of miniature engine-generator sets as power sources for 35 to 400 watts capacity. A summary is given of the present and potential performance characteristics of miniature recriprocating internal combustion engines and miniature a.c. and d.c. generators. Over-all weight, volume, and fuel consumption data are presented, both for specific prototypes in their current state of development, and for potential systems. Reliability, the most serious problem in this size of equipment, is discussed. An outline is included of optimum design features for miniature engines and generators for this type of application. AD 130940. Project 6058, Task 60266. Covers period from Jun 1952-Sep 1956. AF WADC TR 53-180, Part 5.

Study on a-c generating machine characteristics for aircraft electric systems, by Herman J. Braun, Homer B. James, and others. Westingthouse, Electric Corporation. Aviation Engineering Dept., Lima, O. Dec 1954. 464p diagrs, graphs, tables. Order from LC. Mi $11.10, ph $71.10. PB 133066

Emphasis has been placed on the transient performance of the generator in conjunction with other elements of isolated electric power systems. Other topics covering a-c generators and their exciters are also included. Test methods are given which are used to obtain the pertinent characteristics and parameters of aircraft a-c machines. AD 131786. Contract AF 18(600)-402. AF WADC TR 54-557.

Transistor precision sweep generators, by James S. Sherwin. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Antenna Group, Berkeley, Calif. May 1957. 66p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 133215

Simple transistor circuits for the basic bootstrap and Miller sweep generators are developed which exhibit useable linearities of the order of 0.5 to 0.1%. The transistor circuits are designed by direct functional analogy from the equivalent vacuum tube circuits in general use. The transistor sweep circuits are reduced to their a-c equivalent form and analyzed from a network and device parameter point of view to determine the degree of linearity and stability that may be expected of them. Contract Nonr 295(29) Report no. 61. UC IER Series no. 60, Issue no. 182.

Miscellaneous

New techniques for applying the microscope to problems of battery research and development, by A.C. Simon and E.L. Jones. U.S. Naval Research Laboratory. Jun 1958. 31p photos (1 col). Order from LC. Mi $3.00, ph $6.30. PB 132826

A method has been devised for preparing battery sections for microscopic examination. The entire cell or any component thereof is impregnated with an epoxy resin, which after hardening retains everything as it was during operation of the cell. Changes resulting from draining, washing, and drying the batteries, from pouring the plastic, and from the moderate heat evolved as the plastic sets are only slight and can be discounted. Cross sections can be taken which, after suitable polishing and other preparation, can be used for microscopic examination. By viewing the cross sections with polarized vertical illumination through a cellophane-tape film, the detailed structure of both the metallic and the nonmetallic portions can be detected. Because of the unusual color effects in some of the specimens, color photography is sometimes advisable. Studies of corrosion and of the positive and the negative active material have been carried out by this method in order to illustrate its usefulness in the investigation of battery processes. This method can also be a valuable tool in battery quality control by manufacturers. NRL R 5149.

FOOD AND KINDRED PRODUCTS

Caloric intake during prolonged cold exposure, by P.F. Iampietro, David E. Bass, and Elsworth R. Buskirk. U.S. Army. Quartermaster Research and Engineering Command. Environmental Protection Research Division, Quartermaster Research and Engineering Center, Natick, Mass. Sep 1957. 11p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132890

The effects of continuous cold stress on caloric intake and energy expenditure of five men were studied. When corrected for weight loss, caloric intakes averaged 2661 and 2678 calories/man/day for the control and recovery periods, respectively. An increase in resting energy expenditures of about 140 calories/man/12-daytime-hours was observed in the cold period. The increased caloric intake in the cold was associated with an increased energy expenditure due to non-detectable shivering and occa-

sional frank shivering. There was no evidence that cold stress imposed additional caloric requirements apart from those resulting from increased muscle activity. QMC EP TR 66.

Dehydration of milk. Phase I: Origin of off-flavors which occur in dry milk during storage. Final report covering period 20 Jun 1955-19 Jun 1957, under Contract DA 19-129-qm-302, by S. Patton. Pennsylvania State University. Dept. of Dairy Science, University Park, Pa. Jul 1957. 8p diagr. Order from LC. Mi $1.80, ph $1.80. PB 133032

One of the unique flavor changes which milk fat undergoes as a result of heat treatment, storage, or both, concerns the formation of δ-decalactone. Toward the end of controlling this flavor defect, investigational work concerning δ-decalactone was undertaken with reference to: 1.) its origin, 2.) measurement and 3.) prevention. Project no. 7-84-06-031D.

Equipment and operating procedures for lima bean dehydration. Report no. 6 (final), covering period 1 Jun 1955-30 Sep 1956 under Contract no. DA 19-129-qm-335, by A.I. Nelson and M.P. Steinberg. Illinois. University. Dept. of Food Technology, Urbana, Ill. Oct 1956. 36p diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133254

Two general problems were investigated. One was the sulfiting of lima beans with emphasis on method of application used, concentration of sulfite in the product and uniformity of sulfite distribution. A study was also made on the factors which effect cracking and distorting of lima beans during dehydration. Project no. 7-84-06-031C.

Gamma ray sprout inhibition of potatoes. Final report covering period 20 Apr 1955-31 Jan 1957, under Contract DA 19-129-qm-349, by L.E. Brownell. Michigan. University. Engineering Research Institute. Fission Products Laboratory, Ann Arbor, Mich. Feb 1957. 82p photos, diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 133265

Earlier studies indicated that low-dosage gamma irradiation of potatoes was useful in preventing sprouting and spoilage of potatoes under storage without the development of undesirable changes. It is believed that desirable types of potatoes can, by irradiation, be made available the year around. This treatment might be particularly useful in increasing the storage life of any type potato. A study has been conducted to explore the storage properties of irradiated potatoes.

Hypervitaminosis D in Macaca mulatta monkeys: Clinical and pathologic study, by Sidney P. Kent, Gordon F. Vawter, and others. U.S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Tex. Sep 1957. 17p photos, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133284

A colony of 558 monkeys (Macaca mulatta) was inadvertently given a diet high in vitamin D for a period of approximately three months. The clinical and pathologic findings noted in these animals during the period of the high vitamin D diet and for a year thereafter are described and compared to those reported in other species. AF SAM R 57-145.

Nutrient consumption and energy requirements of sedentary military personnel living in a hot dry environment, Yuma, Arizona, Jun-Jul 1957, by C. Frank Consolazio, Frank Konishi, and others. U.S. Army. Medical Nutrition Laboratory, Fitzsimons Army Hospital, Denver, Colo. Feb 1958. 22p tables. Order from LC. Mi $2.70, ph $4.80. PB 133540

A study was conducted on sedentary troops living and working in the heat at Yuma, Arizona for a two-week period. The mean daily temperature averaged 93 and 95°F. for the two weekly periods. The total food consumption for the headquarters company averaged 3999 and 4130 Calories and for the Military Police 4237 and 4595 Calories per man per day for the two weekly periods. Weight changes were negligible in both groups. The high food consumption in the heat may be related to the hours of exposure to the direct sunlight, hours exposed to the outdoor heat, the sweat rate and body temperature of personnel exposed to the hot environment. Project no. 6-60-11-020. USAMNL Subproject no. 1-6. WD MNL R 219.

Packaging and packing of subsistence items. Report no. 7 (final), covering period 1 Jun 1955-31 Dec 1956, under Contract DA 19-129-QM-414, by J.G. Woodroof. Georgia. University. Experiment Station. Dept. of Food Processing, Experiment, Ga. Jan 1957. 12p diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 133266

The effect on the packaging and packing materials of 5-in-1 rations was studied under 27 conditions of assembling, storage and warming-up. Project no. 7-91-03-015D. Unclassified 18 Nov 1957.

Physiological basis for various constituents in survival rations. Part III: The efficiency of young men under conditions of moist heat; appendices of methods and original data, by Frederick Sargent, Virginia W. Sargent, and Robert E. Johnson. Illinois. University. Dept. of Physiology, Urbana, Ill. Apr 1958. 1513p graphs, tables. Order from OTS. $10.00. PB 151025

From June 22, 1955, through July 27, 1955, 100 volunteer airmen served as subjects in a study of survival rations in moist heat at Camp Atterbury, Indiana. The original data collected during the 36-

day period of study on these 100 volunteer airmen are detailed in these appendices. In addition, special studies are reported on renal osmotic regulation and chemical analysis of sweat. A method for analyzing ketone bodies in blood, urine, and sweat is described together with a full report of alterations in ketone body metabolism observed during the 1954 winter study at Camp McCoy and the 1955 summer study at Camp Atterbury. Project 7156, Task 71805. For Parts 1 and 3 of vol. I see PB 128056 and 131525. Contract AF 18(600)-80. AF WADC TR 53-484, Part 3, Vol. 2.

Relationship of radiation induced fat oxidation and flavor, color and vitamin changes in meat. Final report covering period 31 Dec 1954-15 Jan 1956, under Contract DA 19-129-qm-256, by A. L. Tappel. California. University. California Agricultural Experiment Station. Dept. of Food Technology, Davis, Calif. Feb 1956. 7p table. Order from LC. Mi $1.80, ph $1.80. PB 133033

Project 7-84-01-002. File no. S-520. 1. Meat - Effects of radiation

Response of patients to a high-calorie, high-protein chocolate beverage powder, by C. Frank Consolazio, Virginia N. Brice, Carl J. Koehn, and Vernon R. Birchler. U. S. Army. Medical Nutrition Laboratory, Fitzsimons Army Hospital, Denver, Colo. Jan 1958. 11p tables. Order from LC. Mi $2.40, ph $3.30. PB 133539

Studies on 24 subjects have shown that the high-calorie, high-protein chocolate drink developed by the Quartermaster Food & Container Institute is highly acceptable and palatable as a food supplement in normals and in patients with a variety of diseases. There is no decrease in the appetite of these patients during the supplemental feeding period, since the food intake was increased above thecontrol period. Project 6-60-11-020. USAMNL Subproject 2-4.

Role of starch in bread staling. Report no. 19 (termination) covering period 1 Oct 1952-30 Sep 1953, under Contract DA 44-109-qm-1259, by R. M. Sandstedt, Paul H. Figard, and James Fleming. Nebraska. Agricultural Experiment Station. Dept. of Agricultural Chemistry, Lincoln, Neb. Oct 1953. 25p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133226

Project no. 7-84-06-027. 1. Bread staling - Role of starch

Studies on irradiation pasteurization and irradiation sterilization of fruits and vegetables. Final report covering period 1 Oct 1955-30 Nov 1956, under Contract DA 19-129-qm-539, by L. H. Pollard. Utah State Agricultural College. Agricultural Experiment Station, Logan, Utah. Dec 1956. 57p diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 133031

The quality of fresh fruits and vegetalbes was studied in regard to the effect of dose level, storage time and storage temperature, rate of exposure to gamma rays, effects of perforated and non-perforated bags, and pre-irradiation treatment with chemicals (sodium benzoate, sodium propionate, sorbic acid, and ethylene oxide). Project no. 7-84-01-002.

Study of chemical changes produced in irradiated proteins and amino acids, by W. Dexter Bellamy General Electric Co. X-Ray Dept., Milwaukee, Wis. Contract DA 19-129-qm-189. Project 7-84-01-002. Order separate parts described below from LC, giving PB number of each part ordered.

Final report covering period 30 Jun 1954 - 30 Apr 1956. May 1956. 115p diagrs, graphs, tables. Mi $6.00, ph $18.30. PB 133034

This report presents the results of studies of changes occurring in irradiated proteins and amino acids. The radiation source used in these studies was a 1 MeV (peak) resonance transformer operating at 800 KV (peak) and beam currents up to 200 micro amperes.

Supplement to final report, covering period 1 Jul-30 Sep 1956. Oct 1956. 25p graphs. Mi $2.70, ph $4.80. PB 133034s

Results indicate that in dissolved amino acids and peptides, the extent to which some typical chemical changes are produced by ionizing radiation, varies widely with the dose and with the concentration, and varies in a highly complex manner. AD 122075.

Tenderizing meat: Ion protein interrelationships affecting meat quality, by F. E. Deatherage. Ohio State University. Research Foundation. Dept. of Agricultural Biochemistry, Columbus, O. Jun 1956. 43p photo, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133435

A-316, Report 7. Covers period 17 Feb 1955-31 May 1956 under Contract DA 19-129-qm-286. 1. Meat - Tenderizing

FUELS AND LUBRICANTS

Application of Schlieren high speed moving picture techniques to investigation of high speed turbulent flames, by Marjorie W. Evans, Milton D. Scheer, and Louis J. Schoen. New York University, New York, N.Y. May 1948. 18p photos, diagrs. Order from OTS. 50 cents. PB 131860

Methods are described for investigating the hydrodynamical properties of high speed turbulent flames by means of high speed moving pictures of a Schlieren field. Prints made from frames of typical motion pictures are shown. A discussion of the type of data which may be expected to be obtained from these experiments is included. Application of the data to the understanding of combustion in an eddy-turbulent medium is discussed. Technical memorandum 1. Project Squid. Contract N6 ori-11, T.O. 2.

COSAG type fuels for gas turbines, by Henry W. Schab. U.S. Naval Engineering Experiment Station, Annapolis, Md. Sep 1955. 41p photos, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133026

NS 072-504. 1. Turbines, Gas - Fuels 2. COSAG (Fuel) 3. NAV EES 070034B

Distillate fuels in a small open cycle gas turbine, by J.S. Pasman. U.S. Naval Engineering Experiment Station, Annapolis, Md. Dec 1954. 28p photos, drawing, diagrs, graphs, tables (part fold). Order from LC. Mi $2.70, ph $4.80. PB 132921

NS 072-504. 1. Turbines, Gas - Fuels
2. NAV EES 070097A

Effect of sea water contamination in fuel on a small open cycle gas turbine, by J.S. Pasman. U.S. Naval Engineering Experiment Station, Annapolis Md. Jul 1955. 23p photos, tables. Order from LC. Mi $2.70, ph $4.80. PB 133381

1. Turbines, Gas - Fuels - Effect of sea water
2. NAV ESS 070097B

Electrical properties of flames. Part IV: Explosions in longitudinal electric fields, by Hartwell F. Galcote. Princeton University. Dept. of Chemistry, Princeton, N.J. Dec 1948. 15p photo, diagrs, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 134252

1. Flame - Propagation - Theory 2. Gases - Combination 3. Project Squid 4. Project Bumblebee 5. Contract N6 ori-105, T.O. 3, Phase 2, NR 220-038 6. PU TP 41 7. PU TM PR 6

Experimental heat release determination for flame holding in gaseous mixtures, by H.J. Buttner, W.W. Floyd, and N.E. Parshall. Purdue University. Purdue Research Foundation, Lafayette, Ind. Sep 1948. 52p photos, diagrs, graphs, table. Order from OTS. $1.50. PB 131885

Describes a burner equipped with an annular flame holder, which was used to study the requirements of the flame holding mixtures necessary for satisfactory burning in the main stream mixture, and also to determine the effects of variations in the physical and chemical condition of both the main mixture and the flame holding mixture upon the flame holding function. Results of tests are given in graphic form, with photographs of the flame. Appendix consists of a table of burner performance data. Project Squid. Contract N6ori-104, T.O. 1, NR 220-042. PUR 4.

Fluorine-ammonia combustion, by D.E. Mann and G.T. Armstrong. U.S. National Bureau of Standards. Thermodynamics Section, Washington, D.C. Sep 1956. 62p photos, diagrs, tables. Order from OTS. $1.75. PB 121715

The combustion of ammonia in fluorine has been investigated, the heat of combustion measured, and the spectroscopic properties of the flame studied. The final products of the combustion were found to be almost exclusively nitrogen and hydrogen fluoride. Fluorine was generated, and purified in an apparatus developed for this work. An apparatus was designed and built to permit direct spectroscopic investigation of the ammonia-fluorine flame up to 15-20 atmospheres. Spectra of the flame revealed the presence of NH and NH_2. Hydrogen fluoride infrared emission spectra were also observed. The adiabatic flame temperatures for the reaction of ammonia and fluorine in various proportions were calculated. An interpretation of the flame reaction and structure is given. AD 97331. Project 3058, Task 70332. Contract AF 33(616)-53-15. AF WADC TR 55-365.

Grease lubrication of high speed anti-friction bearings. Part 2, by John B. Accinelli and Charles R. Greene. Shell Development Company, Emeryville, Calif. Feb 1956. 52p photos, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 133015

The work reported is a continuation of the study of grease lubrication of ball bearings operating at very high DN values (1.0×10^6 to 2.0×10^6). The work was performed on two high speed rigs. These rigs, utilizing 20 mm ball bearings, required considerable development work in order to obtain satisfactory operation at the desired DN values. Before work on greases was initiated each rig was calibrated with oil-air mist lubrication by running continuously for 100 hours at 1.2×10^6 DN in duplicate tests with two oils, a mineral oil SAE grade 1010 (MIL-0-6081) and a diester synthetic oil (MIL-L-6085A). AD 80397. Project 3044, Task 73312. Covers work from 1 Jan-31 Aug 1955 under Contract AF 33(616)-2443, Suppl. Agreement S 3 (55-972). AF WADC TR 55-102, Part 2.

High temperature antioxidants for synthetic base oils. Part VIII: Evaluation of antioxidants in synthetic fluids, by James W. Cole, Jr. Virginia University. Cobb Chemical Laboratory, Charlottesville, Va. Feb 1958. 74p tables. Order from OTS. $2.00. PB 131975

Two methyl chlorophenyl silicones, F-50 and F-60 were examined at 500°F and 600°F, N, N'-di-2-naphthyl-p-phenylenediamine in 0.1 - 0.2% was the most interesting additive. Work with a mineral oil, MLO 57-30, did not reveal additives of outstanding activity. Substances containing sulfur and selenium showed promise, but some attack on silver and copper. The experiences with four tetra-substituted silanes showed that these substances did not have outstanding response to additives. A series of runs with a pentaerythritol ester, MLO 55-584, indicate that ring substituted aryl amines have considerable antioxidant activity over the range 400°-500°F. Some additional data for bis-(2-ethylhexyl) sebacate are included to compare the promising amines with the phenothiazine type. Some attention was given to determining the nature of the components in an oxidized diester which contributes to the acidity. The limitations of a laboratory test procedure are discussed, especially with respect to the evaluation of the effects of the test metals, aluminum, silver, copper, titanium and several steels. AD 150994. Project 7731, Task 73313. Covers work from Oct 1957 under Contract AF 33(616)-3234. For parts 1-5, 7 see PB121077-121081 and 121990. AF WADC TR 53-293, Part 8.

High temperature solid dry film lubricants, by Melvin T. Lavik. Midwest Research Institute, Kansas City, Mo. Feb 1958. 26p photos, diagr, tables. Order from OTS. 75 cents. PB 131986

This report covers the development and evaluation of a dry lubrication test machine and the testing of several dry film lubricants. The first part of this program was spent in designing, constructing and calibrating such a device capable of testing dry film lubricants at pressures as high as 50,000 psi and at temperatures up to 800°F. Several minor revisions have been made during the program leading up to the machine as reported here. Several commercial dry film lubricants and also some materials prepared at the Institute were investigated for both friction coefficient and wear life at the various temperatures and pressures available with the test machine. AD 150982. Projects 7331 and 3044, Tasks 73312 and 73313. Covers work from 1 Apr 1956-31 Mar 1957 under Contract AF 33(616)-3684. AF WADC TR 57-455.

Inerting conditions for aircraft fuel tanks, by Paul B. Stewart and Ernest S. Starkman. California. University. Institute of Engineering Research, Berkeley, Calif. Sep 1955. 111p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $6.00, ph $18.30. PB 133205

Determination of the flammability limits of aircraft fuel as a function of pressure, type of fuel, temperature and ignition energy was the purpose of this investigation. The investigation was conducted in chambers ranging from 8 to 12.5 cubic feet to determine applicability of small scale laboratory data to aircraft fuel tanks. The data obtained from a capacitor discharge spark ignition source was correleated with similar data obtained using incendiary ammunition as the ignition source. The latter data wa were obtained at sea level pressure. AD 99567. Project 3084, Task 30257. Contract AF 33(600)-17677. AF WADC TR 55-418.

Investigation of gas turbine residual fuels, by Henry W. Schab. U.S. Naval Engineering Experiment Station, Annapolis, Md. Mar 1955. 33p photos, tables. Order from LC. Mi $3.00, ph $6.30. PB 133380

1. Turbines, Gas - Fuels 2. Fuels - Residues 3. NAV EES 070034A

Low viscosity, low volatility silicone-diester instrument lubricants, by William W. Turner. U.S. Naval Avionics Facility, Indianapolis, Ind. Mar 1957. 27p photos, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133421

SCN-D-11 oil has been found to be superior to the di-2-ethylhexyl sebacate type fluids (14-0-20 and MIL-L-6085) for certain applications where low viscosity at low temperatures is required. The volatility of the SCN-D-11 is about the same as that of the di-2-ethylhexyl sebacate lubricants but is much lower than that of the MIL-L-17353 oil. With respect to other properties the SCN-D-11 oil is able to meet the requirements of specification MIL-L-6085. NAFI MR-47.

On the structure of turbulent flames, by K. Wohl, H. Von Rosenberg and others. Delaware. University, Newark, Del. Jun 1956. 31p photos, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 132874

A comparative study has been made between the progress of the chemical combustion process in a number of turbulent flames and the local luminosity of these flames as obtained by a densitometric evaluation of direct photographs. Submitted for presentation at the Sixth International Symposium on Combustion, Yale University, Aug 19-24, 1956. Technical report DEL-6-P. Contract N6 ori-105, T.O. III, NR 098-038.

Preliminary investigation of the effect of a concentration gradient on the stability of laminar flames, by L.W. Walter and E. Miller. U.S. Redstone Arsenal. Ordnance Missile Laboratories, Huntsville, Ala. Apr 1957. 16p photos, diagr, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 133050

Project TB 2-0001. 1. Flame - Effect of pressure 2. Flame - Stability 3. Schlieren photographs 4. RSA OML 2R23F

Silicone fluid research for the development of high temperature hydraulic fluid and engine oils.

Part II, by Edgar D. Brown, Jr. and Norman G. Holdstock. General Electric Company. Silicone Products Dept., Schnectady, N.Y. Feb 1958. 152p photos, diagrs, graphs, tables. Order from OTS. $3.00. PB 131926

Continued study of the chlorophenyl silicone formulation has resulted in development of an additive which greatly improves the lubricity of the base fluid (F-50) without impairing other desirable features such as viscosity-temperature characteristics and oxidation stability below 500°F. This additive is a straight chain linked tin-carbon-silicon-oxygen polymer and is soluble in the base fluid at all temperatures down to -65°F. The tin polymer-silicone formulation has been designated silicone fluid 81717 and will allow for prolonged use in the -65°F to 575°F temperature range. Under appropriate conditions of high pressure and wet atmosphere, hydraulic fluid use in the 650°F - 700°F range is possible. AD 150988. Projects 7331 and 3044, Tasks 73313 and 73314. Covers work from Mar 1956-Mar 1957 under Contract AF 33(616)-2899. Part I not released to OTS. AF WADC TR 56-168, Part 2.

Study of high velocity flames developed by grids in tubes: Role of turbulence in combustion processes, by Marjorie W. Evans, Louis J. Schoen, Milton D. Scheer, and Emmy L. Miller. New York University, New York, N.Y. Jan 1949. 25p photos, diagrs, graphs, tables. Order from OTS. 75 cents. PB 131868

The studies which are described in this report were undertaken for the purpose of elucidating the role which turbulence or eddy motion plays in the combustion of gases. This report is concerned with a restricted type of fluid motion, which might be called transient turbulence, created by the forcing of jets of burning gases into quiescent unburned gas. Technical report 17. Project Squid. Contract N6ori-11, T.O. 2, NR 220-040.

Study of liquid-oxygen boiloff, by David T. Harrje. California. Institute of Technology. Jet Propulsion Laboratory, Pasadena, Pasadena, Calif. Dec 1956. 16p diagrs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133163

The boiloff characteristics of liquid oxygen are studied in a series of tests which provide both a constant heat flux at various flux levels, and a heat flux which varies with time in a manner similar to that obtained from aerodynamic heating in missile flight. CIT JPL M 20-138. Contract DA 04-495-ORD 18.

Techniques for the determination of composition profiles of flame fronts, by R.M. Fristrom, R. Prescott, and C. Grunfelder. Johns Hopkins University. Applied Physics Laboratory, Silver Spring, Md. Dec 1955. 36p photo, diagrs, graphs, table. Order from OTS. $1.00. PB 131548

The understanding of combustion processes can be greatly increased by a determination of the composition of a flame front as a function of position. This report describes techniques for making such measurements. The information can be used to determine reaction rates and to deduce reaction mechanisims and activation energies. Time, velocity, and temperature profiles are also available. Contract NOrd 7386. Project Bumblebee. JHU CM 858.

Theory of flame propagation limits due to heat loss, by E. Mayer. Arde Associates, Newark, N.J. Jun 1957. 41p graphs. Order from LC. Mi $3.30, ph $7.80. PB 133046

An energy balance equation for the flame front relates the actual flame temperature to the adiabatic temperature and a heat loss parameter. Flame propagation limit criteria are deduced for the special cases of 1) convective heat loss applicable to flame quenching in a circular tube, and 2) radiative heat loss applicable to free flames near the composition limit. Illustrative numerical applications are made to hydrocarbon/air data. The theoretical results for both quenching and composition limits are in satisfactory agreement with the observed data. Project Chem 50-16. A.A. Technical note 4555-6. Contract AF 18(600)-1560. AF OSR TN 57-296. AD 132367.

HIGHWAYS AND BRIDGES

Load transmission test for flexible paving and base courses. Part VI: Summary of tests with single-tire loading, by Raymond C. Herner. U.S. Civil Aeronautics Administration. Technical Development Center, Indianapolis, Ind. May 1958. 27p photos, graphs, tables. Order from OTS. 75 cents. PB 131890

This report summarizes and discusses the results from all of the single-wheel loadings on various pavement sections supported by either a weak, medium, or strong sub-grade. Some of the data have been publicized in CAA TDR 203 and 282. The remainder are given in Appendix A. For Parts 1-5 see PB 111828, 121146, 123577, 127853 and 132239. CAA TDR 347.

Studies of slab and beam highway bridges. Part VI: Moments in simply supported skew I-beam bridges, by T.Y. Chen, C.P. Siess, and N.M. Newmark. Illinois. Engineering Experiment Station, Urbana, Ill. Jan 1957. 71p diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. Limited supply available from University of Illinois. $1.00. PB 127273.

The type of structure considered in this investigation is a simple-span skew bridge, which consists of a concrete slab of uniform thickness supported by five identical steel beams, uniformly spaced and parallel

to the direction of traffic. The data were based entirely on analytical considerations, and were obtained by means of the method of finite differences. For Parts III (ILUEES B396) and V (ILUEES B416) see PB 106540 and 112655. University of Illinois bulletin, vol. 54, no. 37. ILU EES B 439.

Widening and resurfacing with bituminous concrete. Highway Research Board. Nov 1956. 51p photos, drawings, diagrs, graphs, tables. Order as NAS Pub. 421 from NAS-NRC Publications Office 2101 Constitution Ave., Washington 25, D.C. 90 cents. PB 127432

Presented at the thirty-fifth annual meeting, Jan 17-20, 1956. 1. Pavements, Bituminous 2. Roads - Surface treatment - Maintenance and repair 3. HRB Bwl 131 4. NRC 421

INSTRUMENTS

Accurate transistorized multiplier-divider, by Robert W. Hoedemaker. Massachusetts Institute of Technology. Servomechanisms Laboratory, Cambridge, Mass. Jun 1956. 67p photo, diagrs, graphs, table. Order from LC. Mi $3.90, ph $10.80. PB 133363

This report describes an analog device that can simultaneously perform the mathematical operations of multiplication and division. The investigation resulting in the development of this multiplier-divider was prompted by the need for a simple, accurate, and reliable electronic means for precisely controlling the loop gain of a rectangular-to-polar coordinate transformation servo. DIC project 7002. Thesis: Massachusetts Institute of Technology. Contract AF 19(122)-458. MIT SL TR 7002-14.

Acoustical evaluation of the Acou-stack treatment in the NACA 10 ft. by 10 ft. wind tunnel, by Robert M. Hoover and others. Bolt Beranek and Newman Inc., Cambridge, Mass. Mar 1958. 20p photo, diagrs, graphs, table. Order from OTS. 75 cents. PB 151028

An acoustical evaluation of the Acou-stack treatment in the Lewis Unitary Plan Wind Tunnel exhaust section at NACA, Cleveland, Ohio, is presented. The noise reduction of this treatment varies from 5 db below 80 cps to a maximum of 60 db at 800 cps, with 50 db or greater noise reduction being achieved for all frequencies from 400 cps to 5000 cps. Also presented are data indicative of the additional noise reduction achieved by the large right-angle bend following the acoustical treatment. This is of the order of 5 db for all frequencies. Measurements at various points through the Acou-stack treatment show that the decrease of sound pressure level with distance is more pronounced at the higher frequencies and, in some of the lower octave bands, the rate of decrease varies with distance. All measurements were made using an explosive noise source. AD 142164. Project 7210, Task 71708. AF WADC TN 57-393.

Acoustical liquid level indicator (U), by A. L. Hedrich and F. Vrataric. U.S. Ordnance Corps. Diamond Ordnance Fuze Laboratories, Washington, D.C. Jun 1957. 6p diagrs. Order from LC. Mi $1.80, ph $1.80. PB 133049

A simple acoustical system is described that is capable of measuring liquid levels and/or automatically controlling the levels. The measuring equipment does not come in contact with the liquid itself. The instrument utilizes a single transducer in a basic sing-around system. An acoustical pulse is propagated thru the medium to the surface from where it is reflected and returned to the transducer as a received pulse. The received pulse initiates another transmitted pulse; thus, the height of a liquid can be determined from the repetition rate of the transmitted pulses. DOFL project 52750. Project TA 3-9110. DA 506-01-010. DOFL TR 464.

Air traffic control color display, by M. F. Williams and A. F. Thornhill. U.S. Naval Research Laboratory. Jun 1958. 11p photos (part col.), diagrs (1 fold). Order from LC. Mi $2.40, ph $3.30. PB 132624

A relatively simple method for obtaining color presentation on cathode ray tubes has been developed at the Naval Research Laboratory. This method, which obtains color variation at the crt face by the variation of the accelerating potential on the crt, greatly simplifies the circuits required for color displays and makes them practical for military use. An air traffic control display has recently been developed which utilizes this new color tube. The display is a two-color (red and green) 5-in. PPI display used in conjunction with the carrier all-weather flying monitor display. The picture on the 19-in. main display is repeated on the color tube, and the two colors are used to differentiate between two categories of aircraft; for example, green for friendly, red for unfriendly or unidentified aircraft. Color will not reproduce. NRL R 5146.

Automatic electronic recording interferometer. Part II: Performance, by Raymond Jonnard. Paterson General Hospital. Clinical and Research Laboratories, Paterson, N.J. Mar 1957. 45p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 132652

The instrument described automatically introduces another compensatory optical path difference equal and opposed to that being measured, by means of an electronic servo-loop. This in turn is transferred into a linear voltage variation which is continuously recorded. Both the accuracy and sensitivity of the measurements - down to a small fraction of k - de-

pend upon the magnitude of the error-signal produced and its ratio to the total instrumental "noise". Contract Nonr-1516(00), NR 011-078.

Calibration of the BRL "Q" gage for measuring dynamic pressure, by Robert J. Drexler. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jul 1956. 15p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132168

The purpose of this experiment was to calibrate the BRL "Q" gage for measuring dynamic pressure. To accomplish this the gage was put into the 24-inch shock tube where shock waves in a pressure range of 5 to 30 psi were produced. The results from the mechanical pressure capsules were compared to the results from the piezoelectric pressure gages. Dept. of the Army project no. 5 B03-04-002. ORD project no. TB 3-0112. APG BRL M 1033.

Calorimetric assembly for the measurement of heats of fusion of inorganic compounds, by J. Goodkin C. Solomons, and G.J. Janz. Rensselaer Polytechnic Institute. Dept. of Chemistry, Troy, N.Y. Sep 1957. 18p drawings, graphs, tables. Order from OTS. 50 cents. PB 131628

A calorimetric assembly is described which was designed for the measurement of heats of fusion of inorganic compounds by the method of mixtures. When used with the calibration technique described it is capable of an accuracy of about ±2%. The simplicity of design and the manner in which the apparatus minizes or avoids many errors possible in high temperature calorimetry is discussed. AD 136548. Project Chem 40-45, Technical note note no. 5. Contract AF 49(638)-50. AF OSR TN 57-565.

Computation of an axially symmetric free boundary problem on NORC. Part II, by R.J. Arms and L.D. Gates, Jr. U.S. Naval Proving Ground, Dahlgren, Va. Apr 1957. 17p diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 133007

Determining the axially symmetric cavitational flow of an ideal fluid past a pair of disks involves the solution of an elliptic partial differential equation where the cavity boundary as well as the flow must be determined. At present no analytic solution of this problem is known. The solution of such a problem is of practical value in estimating drag and cavity size obtained when missiles travel through a fluid. Emphasis was placed on the development of efficient computing procedures in solving problems of this type. Covers work from May 1955-Mar 1956. Part I issued as NPG R 1413. NPG R 1533.

Computer components fellowship no. 347. Quarterly report no. 5, 3rd series, from 1 Oct-31 Dec 1957, under Contract AF 19(604)-1959, by G.H. Young, C.H.T. Wilkins, and others. Mellon Institute of Industrial Research, Pittsburgh, Pa. Jan 1958. 61p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 133250

Cracking of enamel resistor films during temperature cycling has been traced tentatively to mismatches in thermal expansion coefficients between resistor powers (carbides) and either substrates or glazes. Several methods for the production of high-temperature capacitors are outlined. Tests using vacuum deposited gold-palladium resistors have revealed that the cause for resistor failures about 500°C was agglomeration in the printed gold conductors; the gold-palladium resistor films were still intact after heating to 700°C. High-temperature connections made using a silver enamel as the bonding material withstand an appreciable breaking load even at 750°C. Surface resistivity measurements have been made on alumina and on Forsterite substrate materials from 200-800°C. An article surveying the fellowship's activities in the field of high-temperature printed circuitry has been included. AD 146821. AF CRC TN 58-118.

Computer use. Final report for the period from 1 Jul 1954-31 Dec 1956, under Contract no. DA 36-034-ord-1646. Part II, by Hans J. Maehly. Princeton University. Institute for Advanced Study. Electronic Computer Project, Princeton, N.J. Jan 1957. 116p diagrs, tables. Order from LC. Mi $6.00, ph $18.30. PB 133528

This final report is divided into two parts: Part I covers the engineering work carried out from July 1, 1954 through December 31, 1956 under the terms of Contract No. DA-36-034-ORD-1646. Part II lists a number of problems for which, during the same 30 months, numerical results have been obtained with the help of the Institute's Computer. Project TB 3-0538.

Consideration of the use of activated alumina in a modified 3000 psi air separator for the removal of hydrocarbon carryover in divers' high pressure air system, by W. F. Searle, Jr. and J. Wheat. U.S. Navy. Experimental Diving Unit, Washington, D.C. Oct 1957. 31p photos, drawings, diagrs, table. Order from LC. Mi $3.00, ph $6.30. PB 132955

A Navy standard stock high pressure air filter is modified for use as a filter in the high pressure changing line for scuba bottles. Activated alumina is used as the means of removing oil vapors (hydrocarbon) carried over from the compressor. The modifications to the separator are evaluated and found to be unsatisfactory in that filling of the bottle is nearly impossible. The practicability of such a filter is, however, verified provided provision for filling and unloading the alumina is made at the end opposite from the air connections. Proposed modifi-

cations are submitted. The effectiveness of activated alumina in removing hydrocarbon carryover from the divers' compressed air is considered at length. It is shown qualitatively that activated alumina is effective and that a new type, high-impact resistant pellet, of the activated alumina has superior, low dusting qualities. Project NS 186-202, Subtask 5, Test 2. NGF RR 3-58.

Density and viscosity of molten materials. Cincinnati. University, Cincinnati, O. Contract AF 33(616)-9. Project 1252, Task 73019. Order separate parts described below from LC, giving PB number for each part ordered.

Part I: Density of sodium and sodium hydroxide, by M. Nishibayashi. Nov 1953. 55p photos, diagrs, graphs, tables. Mi $3.60, ph $9.30. PB 127927

A densitometer to be used for liquids at temperatures up to ca, 1000°C in an inert atmosphere was constructed from grade "A" nickel. In the construction of this densitometer, the hydrostatic weighing method of Kohlrausch was selected as the method most suitable for the determination of density under the conditions imposed. With this apparatus the density of a material can be measured from its melting point to ca. 1000°C using a single sample of the material. The density of sodium and sodium hydroxide was measured from 254° to 860°C and from 447° to 736°C respectively. For Part 3 see PB 111945. AF WADC TR 53-308.

Part II: Application of Hoeppler, Andrade and piezoelectric crystal viscometers for viscosity measurement, by Joseph W. Sausville. Feb 1955. 60p photos, drawings, diagrs, graphs, tables. Mi $3.60, ph $9.30. PB 127926

The development of a Hoeppler, or rolling ball viscometer for use under a controlled atmosphere was extended to the point of calibrating the instrument over the temperature range 400°-700°C using sodium metal as the calibrating liquid. An Andrade viscometer similar to that which had been used in measuring the viscosity of sodium metal was used in attempts to measure the viscosity of liquid NaOH. Development was started on a viscometer which uses a piezoelectric crystal cut for torsional vibration. Covers work from Jan 1952-Aug 1953. AF WADC TR 53-308, Part 2.

Design of a data storage system for the high performance control center. ACF Industries, Inc., Engineering Dept. Avion Division, Alexandria, Va. Feb 1958. 58p diagrs, tables. Order from LC. Mi $3.60, ph $9.30. PB 133300

In the design of a data storage system for the High Performance Control Center, problems are encountered due to the tremendous quantity and multiplicity of information generated in the center and also received by it. In order to provide an efficient, flexible system, considerable investigation has been made of the equipment both in use and in the planning stages, with the intention of storing as much of the data as possible in a manner suitable for digital computation and analysis. This report covers the aspects of a system involving human coupling between the HPCC and the data storage media, and the aspects of automatic systems. Included in this section is a discussion of the types and quantity of information generated in the HPCC. AD 146805. Covers work from Jul 15-Dec 31, 1957, under Contract AF 19(604)-2648. AF CRC TN 58-107.

Design of coil systems for magnetic field control at the Naval Ordnance Laboratory, by F.W. Warburton. U.S. Naval Ordnance Laboratory, White Oak, Md. Jun 1955. 60p photos, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 127925

The several coil systems used for testing ordnance in the Naval Ordnance Laboratory are designed to produce low intensity magnetic fields over regions of comparatively large volume. Extensive references to the literature and the Naval Ordnance Laboratory reports are given. NAVORD 3768.

Development of navigational briefcase (type MA-1), by D.A. Rosso, Jr. U.S. Naval Air Experimental Station. Aeronautical Instruments Laboratory, Philadelphia, Pa. Sep 1952. 7p drawing. Order from LC. Mi $1.80, ph $1.80. PB 133025

A briefcase was developed for use in single piloted Naval aircraft. A procurement drawing included. BUAER project: TED NAM AE 9143. NAES AIL 51-52.

Differentiator for a-c computers, by Wheeler Johnson. Massachusetts Institute of Technology. Servomechanisms Laboratory, Cambridge, Mass. May 1956. 58p diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 133362

This report describes an electronic circuit which differentiates, with respect to time, the information represented by the amplitude modulation of an a-c carrier wave. Basically, the circuit is a modification of a well known d-c differentiator circuit which utilizes a Miller integrator in a feedback loop, achieving differentiation by the implicit function technique. The principal contribution of this report is the incorporation of a magnetic demodulator into the design so that the circuit can be used in an a-c computing system. The operations of both the Miller integrator circuit and the magnetic demodulator circuit are described in connection with the differentiator discussion. DIC project 7002. Thesis - Massachusetts Institute of Technology. Contract AF 19(122)-458. MIT SL TR 7002-12.

Electronic instrumentation for the NOL 100,000 psi adiabatic compressor, by P. L. Edwards. U.S. Naval Ordnance Laboratory, White Oak, Md. Jun 1955. 37p diagrs. Order from LC. Mi $3.00, ph $6.30. PB 122038r

This report describes the electronic instrumentation for the 100,000 psi adiabatic compressor. The purpose of the electronic instrumentation is essentially threefold: first, the presentation of the pressure-gage signal with suitable calibration lines on the face of a cathode-ray tube for photographic recording; second, the provision of timing markers on the pressure, volume and temperature records so that synchronized records can be obtained; and third, the control of certain instrumentation functions during a compressor run. Revision of NAVORD report 2880 (PB 122038). NAVORD 3559.

Employment and suitability test of the A-20 constant-flow oxygen mask for personnel transported at moderately high altitudes, final report. U.S. Air Force. Air Proving Ground Command, Eglin Air Force Base, Fla. Apr 1957. 10p photos. Order from LC. Mi $1.80, ph $1.80. PB 133260

1. A-20 (Oxygen mask) 2. Respirators, Oxygen generating - Tests 3. APGC Proj. CSC/981-A, Final report

Evaluation of modified 24 inch duplex rotating beacon light, by Clayton S. Hoffman. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Directorate of Flight and All-Weather Testing, Wright-Patterson Air Force Base, Dayton, O. Mar 1957. 15p photos, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 132279

The purpose of this flight test program was to determine if a new lamp developed for the 24-inch, duplex, rotating beacon corrected the deficiencies of the standard lamp. The standard beacon is not visible from the altitudes at which jet aircraft are operating when inbound VFR to an airfield. A rotating beacon modified by the installation of a new lamp (MS25015-2) was evaluated by comparing it with a rotating beacon which was equipped with the standard lamp (MS25015-1). AD 118112. Proj 6172. Covers work from 7 Aug 1956-31 Jan 1957. AF WADC TN 57-77.

Evaluation of vented barricade DP 54711 utilized in the handling of explosive powders, by A. Kush. U.S. Picatinny Arsenal. Industrial Engineering Division, Dover, N.J. May 1957. 18p photos, drawings, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 133428

Report no. DB-5-57. 1. DP-54711(Barricade) 2. Explosions - Protection 3. Barricades - Design 4. Explosives - Handling 5. PA TR PD 501-8

Fabry-Perot interferometer used for wavelength calibrations in the infrared, by Paul William Schreiber. Ohio State University Research Foundation, Columbus, O. Apr 1957. 114p diagrs, graphs, tables. Order from LC. Mi $6.00, ph $18.30. PB 133283

AD 133849. Thesis - Ohio State University. 1. Spectrometers, Infrared - Calibration 2. Wave length measurements 3. Interferometers - Fringe patterns 4. Contract AF 19(604)-1003, Scientific report 7 5. AF CRC TN 57-612 6. OSURF Proj. 587

Final report on Contract DA 36-034-ord-1646, covering period 1 Jul 1954-31 Dec 1956, Part II: Computer use, by Hans J. Maehly. Princeton University. Institute for Advanced Study. Electronic Computer Project, Princeton, N.J. Jan 1957. 115p. Order from LC. Mi $6.00, ph $18.30. PB 133251

Service routines are described, and solutions are given for problems in astrophysics, atomic and nuclear physics, and various fields, such as traffic simulation, automatic network analysis, a table for cumulative binomial probabilities, etc. Contract DA 36-034-ord-1646, Final report, Part II.

Gun fire control system Mark 61, mod. O-2, by Charles H. Shaw and Peter Waterman. Johns Hopkins University. Applied Physics Laboratory, Silver Spring, Md. and U.S. Naval Research Laboratory, Washington, D.C. Order separate parts described below from LC, giving PB number of each part ordered.

Vol. I. Apr 1947. 283p photos, drawing, diagrs (part col., part fold), graphs, tables. Mi $11.10, ph $44.10. PB 132990

Unclassified 15 Dec 1953. Color will not reproduce. 1. Mark 61 Mod. 0.2 (Gun director) 2. Fire control equipment - Design 3. JHU APL TM 135 vol. 1 4. NRL R 3022

Vol. II. Apr 1947. 221p photos, diagrs, graphs, tables. Mi $9.90, ph $34.80. PB 132991

Unclassified 15 Dec 1953. Consists of Appendices A through G. 1. Mark 61 Mod. 0-2 (Gun director) 2. Fire control equipment - Design 3. Radar - Tracking 4. JHU APL M 135 vol. 2 5. NRL R 3022.

Investigation of a film thickness indicator for Diesel engine bearings, by R.B. Snapp and M.D. Hersey U.S. Naval Engineering Experiment Station, Annapolis, Md. Mar 1956. 27p photos, diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 133391

The project on Diesel engine bearings requires instrumentation to determine the minimum thickness of the lubricating film, together with the angular location of the point of nearest approach between journal surface and bearing surface, at every instant during the cycle. The Bureau of Standards indicator presented clear, steady patterns of varying journal-to-bearing gaps and is capable of giving data which can be plotted. AD 105726. NAV ESS 090009.

Low-frequency hydrophone calibration system, by H. Gerber and J. Radford. U.S. Naval Ordnance Laboratory, White Oak, Md. Nov 1956. 74p photos, diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 133157

This report describes a low-frequency hydrophone calibration system which was designed for the measurement of hydrophone sensitivity. Static pressure increments ranging from 1/100 inch to 24 inches of water, and sinusoidal pressures at frequencies ranging from 0 to 400 cps with amplitudes ranging up 4000 microbars may be applied to the diaphragm of the hydrophone being calibrated. The system can be moved into a temperature box permitting calibrations at temperatures from 35°F to 150°F. All calibrations, static as well as dynamic, can be performed at absolute pressures ranging from 0 to 100 psi. Two absolute methods of calibration, known as the static and grille methods, have been developed and are fully described. Theoretical and experimental data for the design and testing of condenser hydrophones are presented. NAVORD 3761.

Measurement of polarity coincidence correlation functions using shift register elements, by Charles R. Greene, Jr. U.S. Naval Ordnance Laboratory, White Oak, Md. Dec 1956. 27p photos, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132494

An instrument has been developed for presenting autocorrelation and cross-correlation functions of severely clipped input signals. The advantages of this system are that its output is normalized, its sampling frequency is variable, and its circuits are simple. NAVORD 4396.

Measurement of temperatures of pulsating burning gases. Summary of papers presented at conference of the Instrumentation Panel of Project Squid, in Washington, D.C. 28 Apr 1948, by John H. Hett. New York University, New York, N.Y. Apr 1948. 59p photos, drawing, diagrs, graphs, tables. Order from OTS. $1.75. PB 131861

Contents: Some fundamental aspects of theories of thermal radiation, by J.K.L. MacDonald. - The measurement of temperature by sodium line reversal in complex flame structures, by H.M. Strong. - Summary of paper entitled the Theoretical Shapes and Intensities of Sodium Lines from Complex Flames, by F.P. Bundy. - Apparatus for radiation of temperature measurements in pulse jets, by J.H. Hett. - The application of lead sulphide (PbS) cell to the measurement of gas temperatures in the combustion chamber and tailpipe of an aeroresonator, by C.M. Wolfe. - Effect of temperature zones on the measurement of temperature by the absolute radiation method in which the optical depth is determined by the L vs 2L method, by F.P. Bundy. - Photoelectric pyrometer and bolometric probes for the measurement of flame temperatures, by J.A. Sanderson, J.A. Curcio and Dorothy V. Estes. Project Squid. Contract N6 ori-11, T.O. 2, NR 220-040.

Pneumatic vibrator for determination of high temperature fatigue properties of sheet materials, by Franklin J. Gillig and Loren W. Smith. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Dec 1947. 11p photos, diagr, graph. Order from OTS. 50 cents. PB 131859

The development of a pneumatic type of testing machine for the evaluation of the fatigue properties of sheet materials at elevated temperatures is described. The manner of operation of the equipment, specimen failure, typical fatigue data and photographs showing details of the apparatus are included. Project Squid. Contract N6 ori-119. CAL DD-420-A-10. CAL TM 10.

Radio channel load distribution analyzer for use in studies of communication flow in radar approach control centers, by James C. McGuire and Conrad L. Kraft. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O., and Ohio State University Research Foundation, Columbus, O. Apr 1958. 12p photos, diagr, tables. Order from OTS. 50 cents. PB 151037

The Radio Channel Load Distribution Anaylzer described in this report was developed in order to obtain measures of frequency of use and time-in-use of radio channels in a radar approach control center. Essentially, the device consists of 110 impulse counters arranged in pairs. Operation of the radio transmitter footswitch by a controller causes the Radio Channel Load Distribution Analyzer to record the transmission of a message by the control ler on a given channel as well as the cumulative duration of all transmissions. AD 142243. Project 7192, Task 71596. Contract AF 33(616)-3612. AF WADC TN 57-424.

Sediment probe, by Jerome Williams. Johns Hopkins University. Chesapeake Bay Institute, Baltimore, Md. Dec 1956. 11p photos, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 130624

Technical report X. Reference 56-3. 1. Probes - Design 2. Bottom sediment 3. Contract Nonr-248 (20), NR 083-016 4. Contract Nonr-248(30), NR 083-070.

Simply constructed contour gage, by W.W. Oshel and William C. Shaw. U.S. Naval Ordnance Test Station, China Lake, Calif. Apr 1957. 16p photos, diagr. Order from LC. Mi $2.40, ph $3.30. PB 133006

The construction details, theory of operation and procedures for the use of a mechanical contour gaging device are discussed. The device was designed for the purpose of obtaining measurements on objects having irregularly shaped contours. It is simply constructed along principles of kinematic design. NOTS 1704. NAVORD 5436.

Some studies on a radioactive - ionization - gage pressure - measuring system, by M.A. El-Moslimany and N.W. Spencer. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Dec 1957. 33p diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 133296

Radioactive ionization gages are known to exhibit a significant hysteresis effect of gas densities where recombination plays an important role in determining the ionization current. Several possible causes are discussed and have been investigated; results have led to the conclusion that hysteresis is caused by changes in the attachment and recombination coefficients due to gas temperature variations. AD 146792. Contract AF 19(604)-1511, Final report. MU ERI Proj. 2406-5-F. AF CRC TR 58-207.

Standard video signal simulator, by M.J. Daughterty. U.S. Naval Research Laboratory. Jun 1958. 22p photos, fold. diagr, graph, table. Order from LC. Mi $2.70, ph $4.80. PB 132434

There has been an increasing need in the Navy radar field for a test equipment capable of simulating radar receiver signals, and which in addition would incorporate certain other test facilities required for the qualitative analysis of radar distribution systems. A flexible test signal was developed which would provide tests for most of the problems encountered in distribution circuits. An engineering model has been constructed which will provide the signal. NRL R 5136.

Test and evaluation of the MA-5 air conditioner, by James L. Hahn and Donald J. Scarafile. U.S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, N.Y. Apr 1958. 31p diagrs, graphs, table. Order from OTS. $1.00. PB 151039

The capacity curves were drawn as a result of the test data obtained. They have been related to both ambient conditions outside and return air temperatures inside, which will prove useful when selecting an air conditioner for a particular system. In addition, the information obtained shows conclusively that data of this kind are necessary for the intelligent selection of units for a given application. AD 148685. Task no. 25107. AF RADC TR 58-54.

Theory and operation of a dynamic tester for evaluating package cushioning material, by Stewart M. Krakover. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. May 1958. 25p photos, graphs, tables. Order from OTS. 75 cents. PB 121692s

The purpose of the ASTM dynamic cushion testing program is described and data from the laboratories which participated in this program are presented. The analysis of the platform type tester together with a discussion of the significance of the elasticity of impact of containers is covered. Several redesigns of the dropping carriage are shown. The desirability of using the platform tester to gather design data is discussed. A discussion is included of the peak reading voltmeter system and a portable spring calibrator. AD 151195. Project 7312, Task 73127. Covers work from Jun 1956-Jan 1958. AF WADC TR 56-342, Suppl. 1.

Thermocouple reference voltage supply, by Leon Allen. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Directorate of Flight and All-Weather Testing, Wright-Patterson Air Force Base, Dayton, O. Oct 1957. 14p photos, diagrs, graph. Order from LC. Mi $2.40, ph $3.30. PB 133211

A voltage supply which has application as standard reference in a thermocouple-type temperature measuring system has been designed. While it is primarily intended to replace the ice bath reference generally used for this purpose, it can be adjusted to simulate any desired temperature. It consists of a conventional cold junction compensator circuit maintained in a temperature controlled environment This report discusses the stability of this device under the stated environmental conditions. AD 142073. Project 913A. AF WADC TN 57-364.

X-ray focusing by diffraction. Annual summary report under Contract Nonr-1780(00) for the period 1 Jul 1955-30 Jun 1956, by Albert V. Baez. Redlands. University, Redlands, Calif. Jul 1956. 13p photos, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 127355

Inability to record more than one or two x-ray diffraction fringes led to a theoretical study of the possible causes of failure. Mathematical and graphical analysis indicates that the causes of weakened contrast in the outer fringes are, in order of importance for x-rays: (a) transmission by the object, (2) width of wavelength pass-band and (c) width of source.

LEATHER AND LEATHER PRODUCTS

Investigation of fungicides for leather, by Martin A. Townsend and Paul A. Albert. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Feb 1954. 21p tables. Order from LC. Mi $2.70, ph $4.80. PB 133165

This research project was undertaken to develop a fungistatic treatment for use on leather items involving intimate, prolonged skin contact. Orthophenylphenol, properly formulated and applied, was found to be an effective fungistatic treatment, as well as non-toxic to the skin at fungistatic concentrations. Results also indicate that the fluorinated compounds, properly formulated and applied, are effective fungicides for leather. A simple method of analysis for determining the pressure of orthophenylphenol was developed. AD 33470. AF WADC TR 54-30.

MACHINERY

Investigations on bearing devices with small friction, by F. Gottwald. Darmstadt. Technische Hochschule. Institut für Technische Physik. Translated from the German. Order separate parts described below from LC, giving PB number of each part ordered.

Report no. 15: Computations and measurements on the air bearing. Mar 1943. 22p diagr, graphs. Mi $2.70, ph $4.80. PB 132013

1. Bearings, Friction - Load - Calculations - Germany

Report no. 17: Tests on air supported course gyros. Nov 1943. 14p diagr, graphs. Mi $2.40, ph $3.30. PB 132014

1. Gyros - Design - Germany
2. Gyros - Theory - Germany
3. Gyros - Friction - Measurement - Germany 4. Gyros - Rotation - Germany

Performance characteristics of the code "A" fuel transfer pump, by Wedless Campbell, Jr. U.S. Arsenal, Detroit. Laboratories Division. Climatic Laboratory Branch, Center Line, Mich. May 1956. 20p photos, diagr, graph, table. Order from LC. Mi $.2.40, ph $3.30. PB 133016

AD 98207. 1. Refueling equipment 2. Pumps, Fuel - Tests 3. DA R 3584 (Final)

Semitrailer mounted oxygen or nitrogen generating and charging plant. Part II: Final report, by S.L. Feldhan. Air Products, Inc., Allentown, Pa. Mar 1956. 98p photos, diagrs (part fold). Order from LC. Mi $5.40, ph $15.30. PB 133371

Design of a mobile generator capable of producing two tons per day of high purity liquid oxygen or liquid nitrogen and capable of compressing the entire production capacity to 4000 PSIG is described. The flows of the operating cycle are pictured and discussed. Material and heat balances are calculated on the basis of theory and past experience gained from the fabrication of more than 500 oxygen generators, both mobile and stationary, of high and low purity type. Specificiations for the equipment components are listed. AD 93139. Contract AF 33(600)-19855. AF WADC TR 54-19, Part 2.

Study of sleeve bearings for aircraft support structures, by W.A. Glaeser, C.M. Allen and others. Battelle Memorial Institute, Columbus, O. Dec 1956. 37p photos, drawing, graphs. Order from LC. Mi $3.00, ph $6.30. PB 132323

The limitations of aluminum, bronze and steel for use as oscillating bearings have been determined experimentally. The parameters studied include bearing load, wear, load-carrying capacity, and coefficient of friction. The bearing design and lubricant were fixed and two types of loading, both oscillating and steady-state radial, were used. Two amplitudes of oscillation, 90 and 13 degrees, were studied. From these data, design charts intended for use in bearing selection for airframe applications have been constructed. Coefficient of friction values are given for various material combustions and bearing loads. Recommendations are made in the Appendix for amending ANC-5, paragraph 2, 61122 "Joints Having Motion, Plain Bearings". Contract NOas 54-344C, Summary report.

Ultrasonic quartz cutting equipment. Raytheon Manufacturing Co., Waltham, Mass. Contract DA 36-039-sc-30282. Order separate parts described below from LC, giving PB number of each part ordered.

Technical manual. May 1956. 104p photos, drawings, diagrs (1 fold), graphs, tables. Mi $5.70, ph $16.80. PB 132042

Supplement to technical manual. n.d. 154p drawings (part fold), diagrs (part fold). Mi $7.50, ph $24.30. PB 132043

Date is May 1956 or later. 1. Ultrasonic

equipment - Design 2. Tools, Cutting - Quartz 3. Tools, Cutting - Ultrasonic

MATHEMATICS AND STATISTICAL ANALYSIS

Approximation by bounded analytic functions. (Abridged), by J. L. Walsh. Harvard University, Cambridge, Mass. Dec 1957. 13p. Order from LC. Mi $2.40, ph $3.30. PB 133225

Approximation of a given function of a complex variable by simpler functions as in the Taylor development, is important both as a tool for theoretical investigations and for numerical analysis. These simpler functions may be polynomials or rational functions, or merely functions bounded in a certain region. AD 148128. Contract AF 18(600)-1461. AF OSR TN 58-80.

Approximation methods in compressible fluid dynamics, part II, chapters V-VII, by Isao Imai. Maryland. University. Institute for Fluid Dynamics and Applied Mathematics, College Park, Md. Mar 1957. 80p diagrs, tables. Order from LC. Mi $4.50, ph $12.30. PB 133368

AD 128411. 1. Flow, Compressible - Theory 2. Equations, Differential 3. Flow, Fluid - Mathematical analysis 4. Contract Nonr-595(08) 5. UM BN 95

Characteristic exponent for the radial wave equation with a Maxwellian potential, by E. Drauglis and B. Widom. Cornell University. Dept. of Chemistry, Ithaca, N.Y. Sep 1957. 6p table. Order from LC. Mi $1.80, ph $1.80. PB 132157

AD 136582. 1. Maxwell's field equations 2. Contract AF 18(603)-111 3. AF OSR TN 57-596

Comparison of the X-transform method with other numerical methods, by C. Heizman, J. Millman and A. Vigants. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories, New York, N.Y. Sep 1956. 36p tables (part fold). Order from LC. Mi $3.00, ph $6.30. PB 133029

The x-transform method for obtaining approximate solutions of linear differential equations is extended to systems with time varying coefficients. This approach is compared with classical numerical methods, in particular, the Runge-Fox method. A detailed comparison between the method of Boxer and Thaler and the x-transform approach is made with respect to accuracy and the amount of labor involved. CU 2-56-ord-1725-EE. Contract DA 30-069-ord-1725. CUN ERL TR T-8/C.

Conditions that a stochastic process be ergodic, by Emanuel Parzen. Stanford University. Dept. of Statistics, Stanford, Calif. Mar 1957. 15p. Order from LC. Mi $2.40, ph $3.30. PB 132761

This paper gives conditions in terms of characteristic functions that a stochastic process be mean ergodic of order K. A theorem is proved. Contract Nonr-225(21), NR 042-993. SU DS TR 11.

Converging cylindrical shocks in magnetohydrodynamics, by G. B. Whitham. New York University. Institute of Mathematical Sciences, New York, N.Y. Jan 1957. 15p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 132444

In this report a method developed by R. F. Chisnell for treating converging cyclindrical shocks in ordinary gas dynamics is applied to the corresponding problem in magneto-hydrodynamics. Contract Nonr-285(06). NYU IMM 237.

Design of circular plates for minimum weight, by E. T. Onat, W. Schumann and R. T. Shield. U.S. Army. Boston Ordnance District, Boston, Mass. Mar 1957. 24p diagr, graph. Order from LC. Mi $2.70, ph $4.80. PB 133286

The minimum weight design of circular plates was investigated by Hopkins and Prager, using intuitive arguments, and by Freiberger and Tekinalp using the calculus of variations. In this paper the direct design procedures developed by Drucker and Shield were used. The formal design procedures were derived from the theorems of limit analysis. Both built-in and simply supported edge conditions are considered and the plate is loaded by an arbitrary rotationally symmetric distribution of pressure. DA 2598/3984/20. Contract DA 19-020-ord-2598. Contract DA 19-020-501-ord-3984. WAL R 143/20-46.

Distribution of shadows, by H. Chernoff and J. F. Daly. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Dec 1956. 32p. Order from LC. Mi $3.00, ph $6.30. PB 132088

This paper deals with the problem of characterizing the probability distribution of lengths of intervals of shade cast on a line of disks randomly distributed in a plane with a point source of light at P. The methods developed for this problem involve the use of certain Markoff processes and a form of the wave equation and are extendable to a generalized version of the problem. Contract N6 onr-25140, NR 342-022. SU AMSL TR 35.

Effect of inadequate models in surface fitting, by G. E. P. Box, J. S. Hunter, and R. J. Hader. North Carolina State College. Institute of Statistics, Raleigh, N.C. n.d. 12p. Order from LC. Mi $2.40, ph $3.30. PB 133409

Ordnance project TB 2-0001(832). DA project 599-01-004. Technical report 5. Date is 1953 or later. 1. Matrix theory 2. Statistical methods 3. Contract DA 36-034-ORD-1177(RD)

Estimations of error for nonlinear elliptical differential equations, by Alfred Meyer. Oct 1956. 49p diagr, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 127289

It is shown that for many nonlinear differential equations the boundary value problem with an elliptical differential equation is of monotonous type and that therefore bounds can be obtained for its solution. Besides the first and third boundary value problems the secondary boundary value problem was also considered. Formulas are given which allow the estimations of error to be carried out quite easily for some cases. The formulas constructed are tried with some examples. AD115032. Contract AF 61(514)-880. AF OSR TN 57-2.

Examination of the motion through air of a rigid body with mass asymmetry, by Gene B. Parrish. U.S. Bureau of Ordnance. Nov 1956. 37p diagr, graph, tables. Order from LC. Mi $3.00, ph $6.30. PB 133264

In problems involving rigid body dynamics, the dynamic terms of the governing equations can be simplified considerably by using a set of principal axes whose origin coincides with the center of gravity of the body. However, in some problems, e.g., the motion of an unsymmetrical top, the equations may be otherwise complicated so that the gain obtained by using such axes is less than might be expected. NAVORD BTN 32.

Greatest lower bound for the variance of unbiased estimates, by Peter Swerling. Illinois. University. Control Systems Laboratory, Urbana, Ill. Apr 1957. 27p. Order from LC. Mi $2.70, ph $4.80. PB 133218

Subtask 3-99-06-111. Report R-90. 1. Variance - Analysis 2. Probability - Theory 3. Statistical theory 4. Contract DA 36-039-SC-56695

Intersection property for cones in a linear space, by R.E. Fullerton. Maryland. University. Dept. of Mathematics, College Park, Md. Nov 1957. 8p. Order from LC. Mi $1.80, ph $1.80. PB 133184

AD 136755. 1. Cones, Convex - Mathematical analysis 2. Contract AF 18(603)-78 3. AF OSR TN 57-765

Interval measurement of subjective magnitudes with subliminal differences, by Muriel Wood Gerlach. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Apr 1957. 185p diagrs. Order from LC. Mi $8.40, ph $28.80. PB 133366

Three types of answers to the question are considered. The first two are categorical in character, the third is hypothetical or conditional. Contract Nonr-225(17), NR 171-034. SU AMSL TR 7.

Inverse Laplace transform of an exponential function, by F.M. Ragab. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research, New York, N.Y. Jul 1957. 18p. Order from LC. Mi $2.40, ph $3.30. PB 133062

AD 133670. 1. Diffraction - Theory 2. Electromagnetic theory 3. Laplace functions 4. Mathematical functions 5. Contract AF 19(604)-1717 6. NYU RR EM 107 7. AF CRC TN 57-760

Maximum principle for hyperbolic equations in a neighborhood of an initial line, by M.H. Protter. California. University. Dept. of Mathematics, Berkeley, Calif. Aug 1956. 21p. Order from LC. Mi $2.70, ph $4.80. PB 133429

AD 106712. Project R-354-10-57. 1. Mathematical equations and solutions 2. Hyperbolic functions 3. Contract AF 18(600)-1117, Technical report no. 6 4. AF OSR TN 56-304

Mean tangential stress in a pressurized rotating grain of hollow cylindrical shape, by L. Bankston and W. Cohen. U.S. Naval Ordnance Test Station, China Lake, Calif. Oct 1956. 11p graphs. Order from LC. Mi $2.40, ph $3.30. PB 132813

A simple formula for the mean tangential stress in a gas-pressurized, rotating, hollow right-circular cylinder is derived. Forces acting on a cylindrical wedge of the hollow, right circular-cylinder model are identified. Radial components of pressure force, stress force, and centrifugal force are computed; and an equilibrium equation for constant angular velocity is stated. The formula resulting from the equilibrium equation is used in designing a graph relating mean tangential stress as a dependent variable to the independent variables of angular speed, gas pressure, outside diameter of cylinder, and inside diameter of cylinder. NOTS 1044. NAVORD 3442.

Method for computation of the greatest root of a positive matrix, by Alfred Brauer. North Carolina. University, Chapel Hill, N.C. Dec 1957. 7p. Order from LC. Mi $1.80, ph $1.80. PB 133187

In UNC Technical Report No. 4 (see also Duke Mathematical Journal 24 (1957), pp. 367-378) a method is obtained to compute the greatest characteristic root of a positive matrix as exactly as needed. In

this paper this method is improved in order to get quicker convergence and to make the method more adaptable for machine computations by avoiding square roots. AD 136739. Project 47500. Contract AF 18(603)-38, Technical report 6. AF OSR TN 57-751.

Method for the measurement of the correlation function and ordinate distributions for two time-history functions, by R. R. Putz. California. University. Institute of Engineering Research, Berkeley, Calif. Jan 1957. 41p diagr, graphs. Order from LC. Mi $3.30, ph $7.80. PB 133397

Some of the theory of a method for estimating the correlation function for a pair of time-history functions is presented. The presentation of the theory is preceded by a discussion, in general terms, of the uses of spectra and correlation functions in the analysis of data. Contract Nonr 222(18), NR 715-102. UC IER Series 61, Issue 11.

Method of the Green's function applied to the diffraction of pulses by wedges, by M. B. Friedman. Columbia University. Dept. of Civil Engineering and Engineering Mechanics, New York, N.Y. Nov 1956. 37p diagrs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133189

The solution for the interaction of an arbitrary acoustic pulse with a rigid, infinite, two-dimensional wedge is derived. The method of solution is based on the use of the Green's function for the wedge. The results are in the form of integrals of elementary functions which are determined by the character of the pulse and the geometry of the wedge. For simple pulse configurations including the plane case, closed elementary solutions can be obtained. These solutions can be utilized to determine the loading produced by such pulses on a box-shaped rigid obstacle. CU 18-ONR-266(08)-CE. Contract Nonr-266(08), Technical report no. 18.

Nondegenerate surfaces and fine-cyclic surfaces, by Wendell H. Fleming. Purdue University. Purdue Research Foundation. Dept. of Mathematics, Lafayette, Ind. Nov 1957. 18p. Order from LC. Mi $2.40, ph $3.30. PB 133185

AD 136756. 1. Surfaces (Mathematics) - Theory 2. Contract AF 49(638)-18, Technical note no. 3 3. AF OSR TN 57-766

Numerical evaluation of multiple integrals. Part II, by Preston C. Hammer and Arthur H. Stroud. Wisconsin. University. Dept. of Mathematics, Madison, Wis. Nov 1957. 42p tables. Order from LC. Mi $3.30, ph $7.80. PB 133178

AD 137022. Dept. of the Army project no. 5B99-01-004. ORD project no. TB 2-0001. OOR project no. 1626. Part I issued in MTAC v. 11, 1957, p. 59-67. 1. Integrals - Tables 2. Mathematical research 3. Contract DA 11-022-ORD-2301, Technical report no. 5

On an analogue of the Euler-Cauchy polygon method for the numerical solution of $u_{xy}=f(x, y, u, u_x, u_y)$, by J. B. Diaz. U.S. Naval Ordnance Laboratory, White Oak, Md. Jan 1957. 54p. Order from LC. Mi $3.60, ph $9.30. PB 132289

1. Mathematical equations and solutions 2. Euler equation 3. Cauchy problem 4. NOL ARR 370 5. NAVORD 4451

On the analyticity of the solutions of analytic nonlinear elliptic systems of partial differential equations. Part I: Analyticity in the interior, by Charles B. Morrey, Jr. California. University. Dept. of Mathematics, Berkeley, Calif. Mar 1957. 34p. Order from LC. Mi $3.00, ph $6.30. PB 133398

1. Mathematical equations and solutions 2. Equations, Differential 3. Contract Nonr-222 (37), NR 041-157, Technical report no. 8

On the coefficients in certain Fourier series, by P. B. Kennedy. Ireland. National University. University College, Cork, Ireland. n.d. 24p. Order from LC. Mi $2.70, ph $4.80. PB 133244

A function satifies a Lipschitz condition, in the strong sense, in a set of positive measure. Also the Fourier series of the function is subject to a gap hypothesis. This report considers what conclusion can be drawn regarding the order of magnitude of the Fourier coefficients of the function in question. Remarks are made concerning the possibility of working with a weak Lipschitz condition. AD 152198. Contract AF 61(514)-1399, Technical note 1. AF OSR TN 58-171.

On the principle of minimum entropy production, by Herbert B. Callen. Pennsylvania. University. Dept. of Physics. Aug 1956. 19p. Order from LC. Mi $2.40, ph $3.30. PB 128122

It is shown that the complete microscopic density matrix of the system is that which minimizes the rate of entropy production subject to the imposed constraints. All magnetic fields are assumed to be zero. It is shown that the kinetic coefficients connecting Casimer's α-type and β-type variables always vanish. The validity of the minimum entropy production theorem in the absence of a magnetic field depends upon this fact. The limitations on the validity of the minimum entropy production theorem in the presence of a magnetic field are briefly discussed. Calculations on particular models by Klein and Meijer and by Klein corroborate the theorem here proved. An analysis of magnetic resonance by Wangsness suggests certain modifica-

tions necessary in this case of a non-zero, non-stationary, magnetic field. Technical report no. 9. Contract Nonr-698(00).

On the solidification of a cylindrical centrifugal casting, by E.W. Ross, Jr. U.S. Arsenal, Watertown, Mass. May 1957. 31p diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133009

This report presents an analysis of the heat flow in a centrifugally-cast gun barrel. The geometry is idealized to that of a hollow, circular cylinder rotating about its longitudinal axis. End effects are ignored. A convenient numerical method of relaxation type is developed to deal with the heat flow during the solidification of the casting. In applying the method, the casting is treated as an accreting, three-layer medium, and the temperature distribution and positions of liquidus and solidus interfaces are found during the early stages of casting. WAL R 613/150.

On the truncation error in a numerical solution of the Neumann problem for a rectangle, by John H. Giese. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Oct 1957. 18p. Order from LC. Mi $2.40, ph $3.30. PB 133213

Dept. of the Army project 5B0306002. ORD project TB 3-0007. 1. Mathematical equations and solutions 2. Neumann problem (Geometry) 3. Laplace functions 4. APG BRL R 1029

Reduction of Mach-Zehnder interferograms by least squares methods, by F.D. Bennett and J. M. Bartos. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Sep 1957. 41p graphs, table. Order from LC. Mi $3.30, ph $7.80. PB 133212

A new method of interferogram reduction employing least squares techniques for fitting fringe-shift data is described and tested. Analysis of the interferometric equation reveals connections between slope discontinuities in fringe-shift and density values. Control of these discontinuities is seen to be important to accurate data reduction. APG BRL R 1027.

Remarks on de La Vallée Poussin means and convex conformal maps of the circle, by G. Pólya and I.J. Schoenberg. Pennsylvania. University. Dept. of Mathematics, Philadelphia, Pa. Nov 1957. 77p. Order from LC. Mi $4.50, ph $12.30. PB 133216

The aims of the present remarks are similar to those by L. Fejér in several papers in the early nineteen thirties. Fejér discovered the remarkable behavior of certain Cèsaro means, especially that of the third Cèsaro means for even or odd functions tions of certain simple basic shapes. It is shown here that the de la Vallée Poussin means possess such shape-preserving properties to a much higher degree thanks to their variation-diminishing character. AD 136609. Contract AF 18(600)-1153. AF OSR TN 57-620.

Representation and analysis of signals. Part I: Use of orthogonalized exponentials, by W.H. Huggins. Johns Hopkins University. School of Engineering, Baltimore, Md. Sep 1957. 79p diagrs, graphs. Order from LC. Mi $4.50, ph $12.30. PB 133065

This report discusses the application of orthogonalized exponential components in representing the elementary signal waveforms associated with each epoch. After formulating a simple analytic representation for a signal generator, the construction of an orthonormal-filter for measuring the signal coordinates relative to an orthonormal basis constructed from any prescribed set of exponentials by Kautz' method, is described. AD 133741. Contract AF 19(604)-1941, Final report. AF CRC TR 57-357.

Robust tests for variances and effect of non normality and variance heterogeneity on standard tests, by G.E.P. Box and S.L. Anderson. North Carolina State College. Institute of Statistics, Raleigh, N.C. n.d. 132p graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 133407

Ordnance project TB 2-0001(832). DA project 599-01-004. Technical report 7. Date is 1953 or later. 1. Variance - Analysis 2. Statistical analysis 3. Contract DA 36-034-ORD-1177 (RD)

Set functions and translation half-rings in the plane, by P.H. Maserick. Maryland. University. Dept. of Mathematics, College Park, Md. Nov 1957. 10p. Order from LC. Mi $1.80, ph $1.80. PB 133186

AD 136754. 1. Geometry, Plane 2. Contract AF 18(603)-78 3. AF OSR TN 57-764

Single-sampling multiple-decision procedure for selecting the multinomial event which has the highest probability, by Robert E. Bechhofer, Salah Elmaghraby, and Norman Morse. Cornell University. Sibley School of Mechanical Engineering. Dept. of Industrial and Engineering Administration, Ithaca, N.Y. Dec 1957. 29p tables. Order from LC. Mi $2.70, ph $4.80. PB 132977

AD 136704. Technical report no. 12. 1. Statistical theory 2. Decision theory 3. Contract AF 18 (600)-331 4. AF OSR TN 57-710

Some third order rotatable designs, by D. A. Gardiner, A. H. E. Grandage, and R. J. Hader. North Carolina State College. Institute of Statistics, Raleigh, N. C. Apr 1956. 86p diagr, graphs. Order from LC. Mi $4.80, ph $13.80. PB 133410

DA project 5B99-01-044. Ordnance project TB 2-0001. OOR project 832. Technical report 12. 1. Sequential analysis 2. Variance - Analysis 3. Statistical theory 4. Contract DA 36-034-ORD-1517(RD)

Statistical method for determining fatigue strengths with limited number of specimens, by J. J. Coleman and W. N. Findley. Brown University. Division of Engineering Laboratory. Engineering Materials Research, Providence, R. I. Jun 1957. 24p graphs. Order from LC. Mi $2.70, ph $4.80. PB 133177

By the proposed method specimens are tested in sequence using a slope-intercept device to insure convergence of the data about a predetermined number of cycles to failure. The method of least squares is then employed to estimate the mean value of the fatigue strength. The relative error of the estimate is determined by use of the Student t-distribution. Possible variations of the method are discussed. Application of this procedure to SAE 1020 steel is presented. AD 137032. Ord project: TB 2-0001 (1348). Dept. of the Army project no. 1348. Contract DA 19-020-ORD-3520, Technical report no. 5. BU EMRL 9.

Statistical test (Monte Carlo) method and its utilization in digital computers (Metod statistichesnikh prob (Monte-Karlo) i yego ispol 'zovaniye v tsifrovykh vychislitel 'nykh mashinakh), by Yu. A. Ahreyder. n. d. 9p. Order from LC. Mi $1.80, ph $1.80. PB 132314

The main idea of the Monte Carlo method is that the unknown quantity is represented as the probability of a certain random event (or as the mean value of a random quantity). By repeated simulation of the corresponding random process, one determines the frequency of occurrence of the event (or the electrical average), which is the approximate value of the quantity to be determined. The simplest of this type is the well-known Bouffon problem, which makes it possible to determine π by throwing a needle on a piece of paper on which equally-spaced parallel straight lines are drawn. If the length of the needle is properly related to the distance between the lines, the probability that the needle will intersect one of the lines is $\frac{1}{\pi}$. Report lists pages 1-20, includes 9 pages only.

Statistics independent of a sufficient statistic, by E. J. Williams. North Carolina State College, Institute of Statistics, Raleigh, N. C. Feb 1957. 11p. Order from LC. Mi $2.40, ph $3.30. PB 133411

DA project 5B99-01-044. Ordnance project TB2-0001. OOR project 832. Technical report 15. Technical report 15. 1. Sampling (Statistics) - Theory 2. Contract DA 36-034-ORD-1517(RD)

Stress analysis in solid propellants, by E. H. Lee. Brown University. Division of Applied Mathematics, Providence, R. I. May 1957. 14p. Order from LC. Mi $2.40, ph $3.30. PB 132830

A phase of the project on the development of methods of stress analysis for solid propellant grains has now been completed. This final report is being written to summarize the accomplishments of the project, to discuss related work carried out elsewhere, and to formulate recommendations for the practical utilization of this work on problems of propellant grain design. Contract Nord-16471, Final report. BU AM TR 16.

Stress due to step velocity applied to a rod consisting of a four parameter visco-elastic material, by D. P. Flemming. Brown University. Division of Applied Mathematics, Providence, R. I. Mar 1954. 34p diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 132829

This report considers a step velocity applied to the end (x=o) of an infinitely long rod, where the relation between the longitudinal strain ϵ and the longitudinal stress, σ, at each point of the rod, is given by a schematic diagram consisting of a series spring-dashpot combination, in series with a parallel combination. Contract Nord-11496. BU AM TR 12.

Synthesis of optimum linear systems for amplitude modulated inputs, by Arthur R. Bergen. Columbia University. Dept. of Electrical Engineering Electronics Research Laboratories, New York, N. Y. Dec 1956. 29p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132105

This formulation applies to such sampled-data problems as deterministic and probabilistic sampling, random sampling, finite pulse width sampling, as well as to other problems which do not involve sampling. The underlying approach adopted in this report is to characterize the modulating function as a random process with known mean and autocorrelation function. An application of the conventional optimization procedure using this characterization leads to a Wiener-Hopf equation of a particularly useful form. The design procedure has been applied to the random sampling and missed samples problems. CU-7-56-AF-1572-EE. Contract AF 19(604)-1572. CUN ERL TR T-4/133. AF CRC TN 57-175.

Uniqueness of double trigometric series under circular convergence, by Victor L. Shapiro. Rutgers University, New Brunswick, N. J. Sep

1956. 5p. Order from LC. Mi $1.80, ph $1.80. PB 126928

1. Mathematical equations and solutions. 2. Contract AF 18(600)-1595. 3. AF OSR TN 56-453.

Variances of regression coefficients for split plot multi-factor experiments, by R.J. Hader. North Carolina State College. Institute of Statistics, Raleigh, N.C. n.d. 17p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 133406

Ordnance project TB 2-0001(832). DA project 599-01-004. Technical report 8. Date is 1952 or later. 1. Least squares 2. Matrix theory 3. Contract DA 36-034-ORD-1517(RD)

MEDICAL RESEARCH AND PRACTICE

Acute adrenal cortical insufficiency and persistent occult dysfunction following thermal injury, by Paul Mandelstam, Joseph W. Goldzieher, Harry S. Soroff, and Norris L. Green. U.S. Army Surgical Research Unit. Brooke Army Medical Center, Fort Sam Houston, Tex. Jan 1958. 21p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133596

Clinical and laboratory observations are reported in a 21-year old white male in good health prior to thermal injury, developing acute adrenal cortical insufficiency postburn. Project: 6-59-12-028. MEDEW RS-1-58.

Amino acid metabolism of man in health and disease Annual progress report for the period 1 Jan -31 Dec 1955, under Contract no. Nonr-1167(00), by Anthony A. Albanese. St. Luke's Hospital, New York, N.Y. Jan 1956. 13p. Order from LC. Mi $2.40, ph $3.30. PB 127193

1. Amino acids - Metabolism

Development of methods for the mass cultivation of human connective tissue and human epithelium and their subsequent employment in medicine and surgery. Final report under Contract NR 115-245 for the period 1 Jul 1950 to 31 Dec 1954, by Johannes Vogelaar. Jan 1956. 13p. Order from LC. Mi $2.40, ph $3.30. PB 127351

Efforts have been made to replace the natural media, such as plasma, serum and tissue extract, by others which can be prepared easily in large amounts. Various solutions were tested. A strain of human fibroblasts was kept growing for a year. The effect of trypsin was studied. Formulas are given for various solutions used.

Effect of static air pressure in the external auditory meatus on hearing acuity, by Ronald G. Hansen. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Apr 1955. 69p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 128139

The specific purposes of this study were to determine the effects of various static air pressures in the external auditory meatus on (a) threshold sensitivity and (b) hearing acuity at two loudness levels above threshold. The effect of static pressure on speech intelligibility was also studied and in the range investigated was found negligible. AD 75597. Thesis - Ohio State University. AF WADC TR 55-95.

Equipment loan Contract Nonr-1864(00). Final report, Jan 1, 1956-Dec 31, 1956, by Robert M. Boynton. Rochester. University, Rochester, N.Y. 1957? 2p. Order from LC. Mi $1.80, ph $1.80. PB 130458

1. Eyes - Chromatic dispersion 2. Vision - Acuity - Psychological aspects 3. Contract Nonr-1864(00), Final report

Inhibition of glucose utilization following thermal injury: Uptake studies by diaphragm in plasma from burned rats, by M. Kendall Young, Jr., Leonard G. Seraile, and Wanda L. Brown. U.S. Army Surgical Research Unit. Brooke Army Medical Center, Fort Sam Houston, Tex. Feb 1957. 12p graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 133263

Inhibition of glucose uptake by rat diaphragm incubated in plasma from burned animals is reported. A dialyzable substance in burn plasma is demonstrated to cause this inhibition. Studies of the nature of this inhibiting action are made. Project 6-59-12-022. Report 2-57.

Lymphatic cannulation: Method for studying equilibration rates in edematyous states, by Charles S. Harrison and Jerrold M. Becker. U.S. Army Surgical Research Unit. Brooke Army Medical Center, Fort Sam Houston, Tex. Dec 1956. 11p. photos. Order from LC. Mi $2.40, ph $3.30. PB 133262

Several modifications are presented which may facilitate the cannulation of the lymphatic channel and aid in the study of lymph and ECF dynamics. Project 6-59-12-022. Research report 11-56.

Approximate elastic spectrum of 8-AuZn from temperature diffuse scattering of x-rays, by M. Schwartz. U.S. Frankford Arsenal. Pitman-Dunn Laboratories Group, Philadelphia, Pa. Nov 1957. 63p photos, diagrs, graphs, table. Order from LC. Mi $3.90, ph $10.80. PB 132346

Intensities were measured over various regions of reciprocal space using balanced filter techniques with a Geiger counter diffractometer and crystal monochromatized CuK_α radiation. The theories of James and Laval were employed to analyze the data associated with the symmetry axes. The contributions of the second order scattering were evaluated by making simple, yet reasonable, assumptions about the energies, velocities, and frequencies of the modes of vibration. The total second order temperature diffuse scattering was no more than about 20 per cent of the first order scattering. The specific heat Debye temperatures of the gold and zinc atoms in the alloy were calculated from integrated intensities of Bragg reflections to be 153° and 220°K, respectively. The intensity of the first order temperature diffuse scattering was used to determine the frequencies of thermal oscillation as a function of the wave vectors associated with the symmetry axes. The method suggested by Cole to separate the acoustical and optical contributions experimentally is discussed. DA project no. 5B9901004. OCO project no. TB2-0001. FAL R 1420.

Conductors for inductive components at extreme environments, by G.W. Monk. American Machine & Foundry Company, Alexandria, Va. May 1958. 25p diagrs, graphs, tables. Order from OTS. $1.25. PB 131988

The development and test of various copper-based alloys for use as conductors in high temperature transformers is described. A one thousand-hour test was carried out on the two groups of commercial copper wire samples, one clad with a protective metallic coating of Type 430 stainless steel and the other with 30 percent Inconel. AD 155545. Project 4155, Task 41869. Contract AF 33(616)-3862. AF WADC TR 57-672.

Corrosion studies in dynamic aqueous systems at elevated temperature and pressure, by M. Krulfeld, M.C. Bloom, and R.E. Seebold. U.S. Naval Research Laboratory. Jun 1958. 14p photo, diagrs, graphs, table. Order from OTS. 50 cents. PB 131775

A method has been developed for applying the hydrogen effusion technique to the measurement of corrosion rates in dynamic aqueous systems at elevated temperature and pressure. The results obtained in measured hydrogen effusion rates at a water flow velocity of one foot per second at a temperature of 316°C and a pressure of 2000 pounds per square inch are reproducible and comparison with hydrogen effusion rates in static systems at this temperature shows that the rates are similar in the two cases. The method also appears highly sensitive to local corrosion. Data obtained from hydrogen effusion measurements in a high-flow-velocity (30 foot per second) loop indicate higher corrosion rates at the higher velocity and confirm the sensitivity of hydrogen effusion rates to localized corrosion. The "in situ" effects of oxygen on the corrosion occurring in the high-velocity system at 316°C have been observed visually and are correlated with the hydrogen effusion data. NRL R 5152.

Creep deformation of magnesium at elevated temperatures by non-basal slip, by A.R. Chaudhuri, H.C. Chang, and N.J. Grant. Massachusetts Institute of Technology, Cambridge, Mass. Nov 1954. 31p photos, diagrs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133196

During the creep of coarse-grained polycrystalline magnesium at elevated temperatures, a non-basal type of slip was found to play an important role in the deformation processes. The non-basal slip traces were examined metallographically in eight specimens (13 grains) and the observed glide plane located stereographically for each grain. The tests were run at 500° and 700°F at stresses of 148 to 786 psi. Based on these measurements and theoretical calculations the crystallographic elements for non-basal slip were determined. Project 7351, Task 70608. Contract AF 33(038)-23281. AF WADC TR 54-593. AD 62119.

Deformation of polycrystalline magnesium-aluminum alloys, by R. Lenhart. General Electric Co. Research Laboratory, Schenectady, N.Y. May 1955. 34p photos, diagr, graphs, table. Order from LC. Mi $3.00, ph $6.30. PB 133193

The tensile and compression flow characteristics of a series of magnesium-aluminum alloys were measured. In single-phase alloys twinning was found to be profuse in specimens deformed by a compression test and almost absent in specimens deformed by tensile testing. The presence of precipitate particles in the high aluminum alloys greatly restricts the formation of growth of twins under compression. AD 81284. Project 7351, Task 70627. Contract AF 33(616)-2120. AF WADC TR 55-112.

Design properties of high-strength steels in the presence of stress concentrations and hydrogen embrittlement. Effects of a number of variables on the mechanical properties of aircraft high-strength steels, by B.B. Muvdi, E.P. Klier, and G. Sachs. Syracuse. University, Syracuse, N.Y. Jan 1956. 226p photos, graphs. Order from LC. Mi $9.90, ph $34.80. PB 133208

This supplement presents graphs of physical properties (including impact strength) of grades 4340, 98B40, vanadium modified 4330, and three other heat treated alloy steels at various testing temperatures or after various tempering treatments. AD 92582. Project 7360, Task 73605. Covers work from Mar 1954-Jun 1955 under Contract AF 33(616)-2362. For parts 1 and supplement to it see PB 121155 and 121155s. AF WADC TR 55-103 Suppl. 1.

Determination of the cerium habit in SAE 1035 steel, by Richard H. Singleton. National Research Corporation, Cambridge, Mass. Nov 1956. 137p photos, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 132180

The purpose of the investigation was to determine the amount, nature, and disposition of the cerium or cerium compounds in commercial SAE 1035 steel to which cerium has been added immediately before or during the pour. Project TR-3-3002. Contract DA 19-020-ord-3455. WAL R 310/190.

Development of niobium-base alloys, by Richard T. Begley. Westinghouse Electric Corporation. Research Laboratories, East Pittsburgh, Pa. May 1958. 113p photos, diagrs, graphs, tables. Order from OTS. $2.50. PB 151004

The flow and fracture characteristics of commercial purity powder metallurgy niobium were investigated in the range 250 to -196 C. The creep-rupture properties of powder metallurgy niobium were investigated at 982 and 1093 C (1800 and 2000 F), and the 100-hour rupture strength of commercial niobium in vacuum was determined to be significantly greater than unalloyed molybdenum. The oxidation behavior of niobium was investigated in the temperature range 350 to 700 C. Oxygen and nitrogen contamination of welding atmospheres was studied to determine its effect on the weld properties of niobium. High-purity niobium, having a hardness of less than 60 VPN, was produced by cage-zone refining techniques. AD 155583. Project 3105, Task 73022. Covers period 1 Jan 1956-1 Mar 1957 under Contract AF 33(616)-3316. AF WADC TR 57-344.

Development of procedure for casting and heat treating vertically cast cored steel plate, by J. William A. Tyler. U.S. Arsenal. Rodman Laboratory, Watertown, Mass. Jul 1957. 12p photos, diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 133277

Vertically cast, cored, steel plate was produced by the procedures outlined in this report. The desired physical properties can be obtained in the metallic portion of the casting through the use of a high temperature homogenization, austenitize, quench, and tempering treatment. WAL RPL 11-2.

Development of techniques associated with the use of the electron microscope to determine the structures resulting from various subcritical thermal treatments of unalloyed low carbon steel. Final report under Contract DA 30-069-ORD-1006, by Althea Revere. Oct 1955. 320p photos, tables. Order from LC. Mi $11.10, ph $48.60. PB 132748

In the one-step process employing a thin film replica made from liquid plastic, the replica is observed directly in the electron microscope. In the two-step positive process a thick first replica is made and a thin film positive replica is then made from the first replica. In this type replica, the elevations and depressions in the replica correspond to the elevations and depressions in the original specimen. The purpose of this project is to study these various replica techniques, to use them on specific steel specimens and from this work, select the technique which gives the most faithful replication of the very fine grain boundaries and the carbides occurring in the grain boundaries and in the ferrite matrix of these specimens. AD 100368. 23 pages of text; the remainder of the report consists of photographic illustrations which will not reproduce well.

Early detection of fatigue in aluminum alloys by ultrasonics, by Karl Sittel, Marvin Herman, and Robert C. Good, Jr. Franklin Institute. Laboratories for Research and Development, Philadelphia, Pa. May 1958. 45p photos, diagrs, graphs, tables. Order from OTS. $1.25. PB 151019

The literature concerning ultrasonic wave propagation and fatigue-induced damage in aluminum has been surveyed to determine the possible interactions. The causes of wave attenuation have been compared with the fatigue effects in metals predicted by various theories, to determine the experimental conditions that would maximize the measurements of those effects. The experimental work has included the design and construction of a resonant type fatiguing machine and an electro-acoustic driving system for ultrasonic waves. AD 155558. Project 7360, Task 73606. Covers period Jun 1-Dec 31, 1957 under Contract AF 33(616)-393. AF WADC TR 58-35.

Effect of alloying elements on grain boundary relaxation in alpha solid solutions of aluminum, by C.D. Starr, E.C. Vicars, and others. California. University. Institute of Engineering Research, Berkeley, Calif. Jan 1952. 53p graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 133448

Small additions of Zn, Ag, Cu, and Ge that form alpha solid solutions with aluminum have no significant effect on the resistance to grain boundary relaxation. Accordingly, the activation energy for these alloys is the same as for pure aluminum, which was found to be 38,000 cal/mole. The activa-

tion energy for Al-Mg alloys, increases linearly from 38,000 cal/ mole at 0% Mg to 54,000 cal/mole for 1647 atomic percent Mg. A relation is given by means of which the grain boundary relaxation was correlated. ATI 143791. 17th technical report. Contract N7 onr-295, T.O. 2, NR 031-048. UC IER Series 22, Issue 17.

Effect of austempering, martempering, and interrupted quenching on transverse properties and distortion and strain aging on yield-tensile ratio, by John Vajda, John J. Hauser, Paul E. Busby, and others. Carnegie Institute of Technology. Metals Research Laboratory, Pittsburgh, Pa. Dec 1954. 43p photos, diagr, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133197

Studies of the effect of martempering, austempering, and interrupted quenching on transverse mechanical properties revealed that cylinders of AISI 4340 as large as 2 in. in diameter and of AISI 4350 at least up to 3 in. in diameter can be heat treated by martempering or interrupted quenching, followed by tempering, to give properties quite similar to those obtained when small specimens of these steels are subjected to a conventional oil quench and a tempering treatment to produce a tensile strength between 250,000 and 280,000 psi. Results of distortion tests made on these two steels indicated that the magnitude of distortion produced by "martempering" at temperatures in the range above M_S to room temperature is a minimum at an intermediate temperature dictated by chemical composition and specimen size. AD 63962. Project 7351, Task 70645. Contract AF 33(616)-2286. AF WADC TR 54-588.

Effect of operating variables on physical properties of copper electrodeposits from acid copper sulfate baths, by R. Wick. U.S. Frankford Arsenal. Pitman-Dunn Laboratories Group, Philadelphia, Pa. Aug 1957. 19p tables. Order from OTS. 50 cents. PB 131579

Copper specimens, approximately 0.015 inch thick were electrodeposited from the acid copper sulfate baths, under 54 combinations of bath concentration, current density, and temperature. It was found that current density and bath temperature had most pronounced effects on the strength and ductility of the deposits. The optimum deposits were obtained at 25° to 40° C. and 3 amp/dm^2 in a bath 1.0N in copper sulfate and 1.5N in sulfuric acid. DA project 5A04-07-001. Ordnance project TA 3-5204. FAL MR 656.

Engineering properties of commercial titanium alloys, by M.W. Mote, R.B. Hooper, and P.D. Frost. Battelle Memorial Institute. Titanium Metallurgical Laboratory, Columbus, O. Jun 1958. 260p graphs, tables. Order from OTS. $4.00. PB 121647

This report is a revision of Titanium Metallurgical Laboratory Report no. 15, which was issued in Sep 1955. Data on unalloyed titanium has been added as well as data on new alloys released to date. BMI TML R 92.

Evaluated-temperature testing procedures. Part 1: Continuous recording of time deformation readings during creep-rupture testing at temperatures up to 1200°F, by William H. Rector and Charles A. Townsley. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Feb 1955. 12p photos, graph. Order from LC. Mi $2.40, ph $3.30. PB 133372

A new method of recording deformation during creep-rupture testing at temperatures up to 1200°F is presented. This method has the advantages of: (1) obtaining a continuous time deformation record up to failure, compared to the intermittent readings obtained using the former manual method and (2) being completely automatic, thus saving the technician's time required to make manual measurements. This method employs cameras to record the data. A description of the equipment is given. AD 63270. Project 7360, Task 73605. AF WADC TR 54-214, Part 1.

Fatigue strength investigation of titanium alloy weld joints for aircraft propeller blades, by K.C. Lockhart. General Motors, Corporation. Allison Division. Aeroproducts Operations, Dayton, O. Feb 1955. 50p photos, drawings, diagrs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133438

Engineering report no. 977. For later report see PB 127892. 1. Propeller blades - Joints - Titanium 2. Joints, Welded - Titanium - Fatigue 3. Contract NOa(s)-51-829c.

High impact strength steels for low temperature service. Paper presented at research conference on strength limitations of metals, sponsored by Syracuse University Research Institute and Ordnance Materials Research Office, Watertown Arsenal, by A. Hurlich. U.S. Arsenal. Materials Engineering Laboratory, Watertown, Mass. Aug 1955. 21p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133390

The addition of 2 pounds per ton of rare earth metals on low alloy boron-treated steels is shown to increase ductility and toughness at high strength levels. WAL R 710/930-6.

High temperature materials, their strength potentials and limitations. Proceedings of the 4th Sagamore Ordnance Materials Research Conference, Aug 21, 22, and 23, 1957. Racquette Lake, N.Y. 1957. 362p photos, diagrs, graphs, tables. Order form OTS. $5.00. PB 131834

Contents: Fundamental relations governing high temperature strength: Theory of high temperature deformation of metals, by G. Schoeck. - Theory of high temperature strength of alloys, by J.C. Fisher. - A survey of recent results on experimental determinations of activation energies for creep, by J.E. Dorn. - Effects of structure on high temperature strength: The stability of microstructures and related physical properties at elevated temperatures, by W.H. Steurer. - The relation of microstructure and high temperature strength, by R.W. Guard. - Effects of high speed heating and loading: Tensile properties of some structural sheet materials under rapid heating conditions, by G.J. Heimerl. - Prepared discussion, by W.F. Simmons. - Prepared discussion, by S.F. Frederick. - Mechanical properties of structural materials under conditions of rapid heating and rapid loading, by J.R. Kattus. - Thermal cycling and thermal fatigue: Thermal fatigue of ductile materials, by F. Clauss. - Plastic strain absorption as a criterion for high temperature design, by C.R. Kennedy. - Strain cycling and thermal fatigue, by L.F. Coffin. - Effect of complex loading on high temperature strength: Design under conditions of relaxing complex stress concentrations, by H.R. Voorhees. - A survey of the effects of nonsteady load and temperature conditions on the creep of metals, by S.S. Mason. - Dinner speaker: Chemistry at high temperatures and pressures, by H. Tracy Hall. MET 497-582. Co-sponsored by the Ordnance Materials Research Office and the Office of Ordnance Research, U.S. Army. For proceedings of the 1955 and 1956 conferences see PB 131280-131281 and 131783.

Influence of boron on the hardenability of steel, by Morris E. Nicholson. Chicago. University. Institute for the Study of Metals, Chicago, Ill. Jun 1955. 16p photos, graphs. Order from LC. Mi $2.40, ph $3.30. PB 133192

A summary is given of research on the influence of boron on the hardenability of steel including research not elsewhere reported on the influence of boron on the relative interfacial tension of austenite and on austenite decomposition in a 0.5% B, 0.5% C iron alloy. Included is a reveiw of the present state of knowledge of the boron effect on the hardenability of steel. AD 82673. Project 7351, Task 70645. Covers work from 1 Jul 1951-30 Jun 1955 under Contract AF 18(600)-12. AF WADC TR 55-233.

Inhibition of titanium in fuming nitric acid, by John B. Rittenhouse and Cornelius A. Papp. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Mar 1957. 11p photo, table. Order from LC. Mi $2.40, ph $3.30. PB 133298

The samples investigated were 1/2-in. squares (0.020 in. thick) of commercially pure titanium (75A) and a binary 8%-manganese alloy (C110M). Results of the investigation indicated no inhibition of titanium corrosion by oxygen, but confirmed the inhibiting effect of a water content of 1 to 2% in the FNA. Contract DA 04-495-ORD-18. CIT JPL M 20-140.

Internal friction studies in impurity-doped single copper crystals, by Ralph R. Stevens, Jr. Cornell University. Dept. of Engineering Physics, Ithica, N.Y. Feb 1957. 56p photos, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 127309

The temperature dependence and amplitude dependence of the internal friction of impurity-doped single copper crystals was measured in the temperature range of 27°C to 900°C and in the strain amplitude range of 10^{-8} to 10^{-5} at frequencies in the kilocycle range. The method of measurement consisted in exciting reeds in transverse modes of vibration and then determining the decay time of the resulting free damped vibrations. The results obtained are compared with those of other investigators and are interpreted in the light of modern dislocation theories. AD 120411. Thesis, Cornell University. Contract AF 18(600)-1000, Technical report no. 2. AF OSR TR 57-11.

Investigation of heat treatments and mechanical properties of high strength steel castings, by J. William A. Tyler and Paul J. Ahearn. U.S. Arsenal. Rodman Laboratory, Watertown, Mass. Aug 1957. 35p photo, diagr, graphs, tables. Order from OTS. $1.00. PB 131638

1. Steel castings - Heat treatment 2. Steel castings - Mechanical properties 3. Steel, Silicon - Tensile properties 4. WAL RPL R 11/5

Investigation of leaded steels, by K.L. Kojola. U.S. Naval Gun Factory. Engineering Research and Evaluation Division, Washington, D.C. May 1957. 41p photos, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133055

According to the literature, 0.15 to 0.35% lead, uniformly dispersed throughout a steel, improves its machinability without adversely affecting its mechanical properties. An investigation was conducted to determine the influence finely dispersed lead, in the amounts specified, might have upon the mechanical properties. NGF-TR-2-57. NAVORD 5206.

Investigation of mechanical properties and physical metallurgy of aircraft alloys at very low temperatures. Part II: Strength properties and hardness, by M.G. Fontana. U.S. Air Material Command. Engineering Division. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Oct 1948. 125p photos, diagrs, graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 130662

The hardness, impact, tensile, fatigue, and dilato-

metric properties of 12 alloys were determined over the temperature range +25 to -196°C (+70 to -321°F). The materials included 2S-3/4 H aluminum, 24S-T, 61S-T, and 75S-T aluminum alloys. SAE 2330 steel, normalized and also hardened, NE 8630 steel, normalized and also hardened, type 304 (18-8S) stainless steel, cold drawn to 210,000 psi tensile strength, type 322 (W) stainless steel, precipitation hardened, 8 1/2% nickel steel (AISI 2800), FS-1 magnesium, and aluminum bronze. Additional work included impact tests of a laminated glass plastic, compression tests of the 24S-T and 75S-T aluminum alloys, FS-1 magnesium, 18-3 stainless, and hardened SAE 2330 steel, and tensile tests and a dilatometric study of the 125S-T aluminum alloy. For Part I see PB 98635. ATI 52739. Contract W-33-038-sc-15698(16915), Final report. AF TSEAM 5360, Add 1. AF TR 5662.

Investigation of the compressive, bearing, and shear creep-rupture properties of aircraft structural metals and joints at elevated temperatures, by Luke A. Yerkovich. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. May 1958. 124p graphs, tables. Order from OTS. $2.75. PB 131977

This project was initiated to supplement the usual tensile creep and rupture data. The high temperature creep strengths of a number of structural air craft alloys were determined when under the influence of compression, bearing, and shear stresses. Specifically, data of these types are required to formulate high temperature joint design criteria. This report summarizes three years of study on the creep behavior of fifteen sheet, plate, and bar alloys creep tested in tension, compression, bearing, and shear. In addition, correlations of tensile creep and rupture properties with compression, bearing and shear creep-rupture properties have been made and are presented in tabular form. AD 151194. Project 7360, Task 73605. Covers work Jan 1955-Dec 1955 under Contract AF 33(616)-190. For parts 1 and 2 see PB 121436 and 121656. AF WADC TR 54-270, Part 3.

Investigation of the normal magnetic permeability of AISI type 201 and 202 steels, by M. R. Gross. U.S. Naval Engineering Experiment Station, Annapolis, Md. Jan 1957. 7p tables. Order from LC. Mi $1.80, ph $1.80. PB 133247

This report describes the effects of cold deformation on the normal permeability of AISI Type 201 and 202 chromium-manganese-nickel steels. Data are presented for field strengths ranging from 0.5 to 200 oersteds and for cold reductions ranging from 0. to 30%. It was concluded that the permeabilities of the subject steels were similar to their more strategic counterparts, i.e., AISI 301 and 302 chromium-nickel steels. NSM 013-126. NAV EES 040095.

Liquid metal heat transfer fluid; volumetric changes in alloys freezing below 98°C, by J. L. Everhart and E. L. Van Nuis. American Smelting and Refining Company. Research Dept., Barber, N.J. Jun 1950. 22p diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133019

The changes involume of a series of low-melting alloys on freezing and cooling to 20°C have been determined by means of a volumetric dilatometer. The materials investigated were the eleven eutectic alloys, freezing below 98°C, in the systems containing bismuth, indium, lead, tin, and thallium. All of the alloys contracted on freezing. Two expanded after solidification while the others showed no such effect. ATI 86791. Problem no. 526, under Contract N8 onr-64401.

Lubrication of titanium, by Nicholas Fatica. Clevite Corporation. Clevite Research Center, Cleveland, O. May 1958. 86p graphs, tables. Order from OTS. $2.25. PB 131981

This investigation sought to obtain some information about the frictional properties of modified titanium coatings and to make a comparison of the wear resistance of the best surface treatments in the presence of various lubricants using the Shell Four-Ball Wear Tester and the Falex Tester. The correlation of wear rates with the frictional characteristics of the different systems was attempted in both testers with moderate success. AD 155564. Project 7351, Task 73510. Covers work from Mar 15-Dec 15, 1957 under Contract AF 33(616)-3350. For Part 1 see PB 131650. AF WADC TR 57-61, Part 2.

Macroscopic imperfections in aluminum single crystals and motion-micro studies, by R. B. Pond and M. Lauriente. Johns Hopkins University, Baltimore, Md. Dec 1954. 41p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133195

In Part I, the apparatus and techniques for measuring strains of the order of 0.2 micro inches is described. Stress-strain diagrams are developed for 12 aluminum single crystals. These data are compared with the extent of imperfections in the crystal as indicated by etch pits. Effects of prior plastic deformation on Young's elastic modulus are presented. Qualitative explanations of the phenomenon utilizing the dislocation model is advanced. In Part II, a survey is given of the motion micro-studies of (a) gold single crystals under tensile defromation, (b) aluminum single crystals having various thicknesses of aluminum-oxide under tensile deformation, (c) aluminum single crystals under compressive load, and (d) aluminum single crystals under compressive load after tensile extension. AD 63460. Project 7351, Task 70608. Contract AF 33(038)-12902. AF WADC TR 54-608.

Magnetic transformation in MnBi, by R. R. Heikes. Westinghouse Electric Corporation. Research Laboratories, East Pittsburgh, Pa. Jan 1955. 11p diagr, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 132254

Manganese bismuth loses its spontaneous magnetization very sharply at 633°K. At the same temperature drastic changes occur in the lattice constants. Previous workers have interpreted both these phenomena as arising from a ferromagnetic-antiferromagnetic transition. The present work indicates that the phase existing above 633°K is actually a ferromagnetic one with a Curie temperature of about 470°K. Project 7080, Task 70651. Contract AF 33(616)-309. AF WADC TR 55-166.

Manufacture of thin gage titanium alloy sheet. Final technical report covering period 6 Dec 1955-6 Dec 1956, under Contract NOa(s) 56-265-f, by Kenneth M. Barnes. Mallory-Sharon Titanium Corporation, Niles, Ohio. Mar 1957. 5p tables. Order from LC. Mi $1.80, ph $1.80. PB 133156

This contract provided for the study to develop a means for processing (minimum to .020) titanium alloy sheet, with mechanical properties meeting Spec. MIL-T-9046A.

Mechanical properties of type 301 stainless sheet steel. Summary report to American Iron and Steel Institute, by L.P. Rice, J.W. Lodge, and G.K. Manning. Battelle Memorial Institute, Columbus, O. May 1957. 36p graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 134265

The mechanical properties of Type 301 stainless steel sheet material after various amounts of cold rolling have been studied by means of tensile, compression, and bearing tests. Compression yield strength in the transverse direction increased rapidly as the ultimate strength was increased by cold. At the higher tensile strengths it was somewhate greater than the tensile yield strength in either the transverse or longitudinal direction. In the longitudinal direction, however, the compressive yield strengths were less than 50 per cent of the yield strengths in the transverse direction at all ultimate tensile strength levels in excess of 130,000 psi. The bearing ultimate and yield strengths in the longitudinal direction have a linear relationship to the ultimate tensile strength.

Notch sensitivity of titanium alloys and heat treated steels. Final report, Part I: Basic relations for notched cylindrical and prismatic tension test specimens, by George Sachs, John G. Sessler, R. Ford Pray, and Tsu Hsing Yeh. Syracuse University. Research Institute. Metallurgical Research Laboratories, Syracuse, N.Y. Jan 1958. 44p photos, diagrs, graphs, table. Order from LC. Mi $3.30, ph $7.80. PB 133294

The basic relations which govern the behavior of materials in the presence of stress concentrations, as exhibited by notching, were investigated for cylindrical and prismatic tension test specimens. The effects of notch geometry, specimen shape, type of loading, material history and test temperature were studied and evaluated for both heat-treated steels and titanium alloys. Report no. MET 481-581F1. Contract NOas 57-483-d, Final report.

Preparation of single crystals of beryllium and zirconium: Study of mechanical properties. Quarterly report Jul 1-Sep 30, 1950, under Contract N6onr-259/VIII, Project NR 031-308, by Dr. R.M. Brick, H.T. Lee, and H. Greenewald. Pennsylvania. University. Towne Scientific School. Dept. of Metallurgical Engineering, Philadelphia, Pa. Oct 1950. 7p. Order from LC. Mi $1.80, ph $1.80. PB 133402

Fifteen single crystal specimens of beryllium have been prepared. Compressed normal to the basal plane at room temperature, no plastic behavior was observed and deformation was apparently solely elastic up to a stress of about 285,000 psi. at which point fracture occurred. Compressed parallel to the basal plane, (10T2) twining was observed and a critical stress calculated. Zirconium has been obtained and is being annealed for single crystal production. Work is proceeding on the hardness, microstructure and precision lattice parameter changes of zirconium with addition of oxygen and nitrogen. AD 137628. Contract N6onr 249, T.O. 8, NR 031-308.

Production of titanium castings, by R.A. Beall, F.W. Wood, J.O. Borg, and H.L. Gilbert. U.S. Bureau of Mines. Aug 1956. 45p photos, diagrs, graph, tables. Order from LC. Mi $3.30, ph $7.80. PB 133047

This paper summarizes the development of a furnace for producing titanium castings, The general problem is outlined and chronological details are given on the construction and operation of four different casting furnaces, all utilizing consumable-electrode arc heating and water-cooled copper crucibles. Of the two methods of pouring, the tilt-pour technique has been more satisfactory than bottom tapping. Mold design, electrode fabrication, and deep-pool production are discussed. Ord project: TB 4-15. BM RI 5265.

Properties of copper base castion alloys (allotment no. 95501, Dept. of the Navy, Bureau of Ordnance). Part VIII: Effect of various treatments on tensile properties of sand cast aluminum bronze, MIL-B-16033 (BuOrd) class 1. Progress report, by Vincent DePierre. U.S. Naval Gun Factory. Engineering Research and Evaluation Division, Washington, D.C. Apr 1957. 11p graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 133161

Aluminum bronze tension test specimens were heat treated by 2 methods to determine their effect on tensile properties. Method 1 consisted of heating the specimens at 500F to 1800F and either furnace cooling or water quenching. Method 2 consisted of

heating to 1800F, furnace cooling, removing specimens at 100 F intervals, and water quenching. Room temperature tensile properties were not adversely affected by heat treatments. NGF T 17-57. NAVORD 5508.

Radiation effects in metals and insulators, by John J. Antal. U.S. Arsenal. Watertown, Mass. Materials Research Laboratory. Nov 1956. 22p graphs. Order from LC. Mi $2.70, ph $4.80. PB 133252

Dept. of the Army project no. 593-26-006. OO project no. T.B4-911. Presented at the First Army Materials Conference, held at Natick and Watertown, Mass., June 6, 1956. 1. Insulating materials - Radiation effects 2. Metals - Radiation effects 3. WAL MRL 24

Relation of high-heating-rate tests to very-short-time creep tests, by W.K. Smith. U.S. Naval Ordnance Test Station, China Lake, Calif. Mar 1955. 21p photos, diagr, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 133420

High-heating-rate curves were derived graphically from a family of very-short-time creep curves for a low-carbon steel. It was found that curves from high-heating-rate tests were displaced to considerably higher temperatures than the derived curves. A special step-temperature, very-short-time creep test revealed the presence of a "delay" in start of creep when prior creep occurred at a lower temperature. The initial delay in creep under certain conditions was believed to be caused by the effect of carbon atoms collected in the substructure boundaries. Covers work from Jan 1953-Mar 1954. NOTS 995. NAVORD 3403.

Salt water corrosion and corrosion fatigue properties of Allegheny Ludlum AM-350 alloy, by W. Lee Williams. U.S. Naval Engineering Experiment Station, Annapolis, Md. May 1956. 11p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133248

Allegheny Ludlum AM-350 alloy was tested to determine its salt water corrosion fatigue properties and its sea water corrosion and stress corrosion characteristics. The alloy was a Cr-Ni-Me stainless steel, which was austenitic at room temperature and hardenable by transformation to martensite at -100°F. The corrosion resistance was good but the alloy was subject to local crevice corrosion like many other stainless steels. The corrosion fatigue resistance was comparable to the best of other high strength corrosion resistant alloys. NS 013-123. NAV EES 040034J.

Serviceability of boron steel components, by R. E. Fish. U.S. Aberdeen Proving Ground. Development and Proof Services. Automotive Division, Aberdeen Proving Ground, Md. Feb 1957. 46p photos, drawings, diagr, tables. Order from LC. Mi $3.30, ph $7.80. PB 133529

DA project no. 548-12-001. OCO project no. TTI 19S, Eighth report. 1. Steel, Boron - Tests

Structural design criteria for titanium alloys. Final report, Vol. 1, by C.E. Parsons. Boeing Airplane Company, Seattle, Wash. Apr 1956. 297p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $11.10, ph $45.60. PB 127896

Structural design criteria for titanium alloys were determined through tests at room and elevated temperatures. These criteria included basic mechanic cal properties, riveted and bolted joints, crippling of formed and extruded sections and intermediate tension-field shear panels. The titanium alloys tested were the C-110 M, A-110AT, RS-110BX and 6Al-4V alloys. AD 96362. B-52 Manufacturing processes analysis. Study no. 1. For study 2 see PB 128996. D 14460-F-1. Contract AF 33(600)-23223, Final report, vol. 1.

Studies, research and investigations of the optical properties of thin films of metals, semi-conductors and dielectrics, by Lawrence N. Hadley, Jr. Colorado A&M College. Dept. of Physics, Ft. Collins, Colo. Feb 1956. 21p diagr, graphs. Order from LC. Mi $2.70, ph $4.80. PB 133386

This report is divided into two parts. The first part deals with studies on the fluorescence due to exciton absorption in cuprous oxide, and the second part presents further calculated curves of the reflectivity and transmissivity of films as a function of thickness measured in waves lengths. AD 109512. Covers work from Aug 1, 1955-Jan 31, 1956 under Contract DA 44-009-ENG-2618. Project 8-23-02-311.

Survey of experimental facilities for rolling thin, wide, high-strength, high-temperature materials for aircraft construction, by R.L. Carlson and C.H. Lorig. Battelle Memorial Institute. Titanium Metallurgical Laboratory, Columbus, O. Jul 1957. 39p. Order from LC. Mi $3.00, ph $6.30. PB 132868

The survey was conducted to determine whether experimental facilities are available for the necessary research studies which must be made to develop the information for designing new mills and developing new rolling practices. The survey was performed by visits and conversations with representatives of primary metalworking companies, mill manufacturers and industrial research laboratories. It was determined that both laboratory and production rolling facilities are available for conducting experimental programs directed to the rolling of thin, wide sheet. Contract AF 18(600)-1375. BMI TML 76.

Temperature dependence of the attentuation of ultrasound in a nickel single crystal, by Forrest West. Brown University. Metals Research Laboratory, Providence, R.I. Apr 1957. 142p photo, diagrs, graphs. Order from LC. Mi $7.20, ph $22.80. PB 133181

1. Crystals, Nickel - Temperature effects
2. Crystals, Nickel - Electrical properties
3. Waves, Electromagnetic - Attenuation - Theory
4. Contract DA 19-020-ord-3650
5. WAL R 143/30-2

Tensile creep of high-purity aluminum, by R.W. Guard and W.R. Hibbard, Jr. General Electric Co. Research Laboratory, Schenectady, N.Y. Nov 1954. 29p photos, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133198

As part of a program on the mechanical properties of high-purity metals, the tensile creep properties of 99.996 per cent aluminum have been determined. These data have been examined on the basis of a number of current theories, both mechanistic and empirical. None of the theories adequately describe the behavior over all of the stresses and temperatures examined. X-ray and metallographic examination was conducted on several specimens after creep. Changes in preferred orientation and grain size for the specimens took place during the creep. These observations may account for some of the deviations from the theoretical behavior. AD 63961. Project 7351, Task 70627. Contract AF 33(616)-2120. AF WADC TR 54-565.

Tension and impact properties of steel heat treated to 160,000 - 190,000 psi yield strength at temperatures between minus 40°F (impact) and 800°F (tension), by N.J. Manzari and G. Sachs. Syracuse University Research Institute. Metallurgical Research Laboratories, Syracuse, N.Y. Aug 1956. 118p photos, drawings, graphs, tables. Order from LC. Mi $6.00, ph $18.30. PB 132051

The stability of tensile and impact characteristics of three low-alloy steels, having carbon contents between 0.25 and 0.35 percent and heat treated to yield strength values between 160,000 and 190 psi, was investigated. These were subjected to cyclic tempering at temperatures between 400 and 900°F up to 1000 times, for 5 minutes each. The changes in tensile strength characteristics at temperatures between room temperature and 800°F and in impact strength between -320 and +560°F produced by these treatments were determined. DA project 502-01-001. Ordnance project TS 4-4018. Report MET 348-572F. Contract DAI-30-115-505-ord-(P)-624, Final report. WAL R 310/210.

Theory for combined bending and torsion fatigue with data for SAE 4340 steel, by W.N. Findley, J.J. Coleman and B.C. Handley. Brown University. Engineering Materials Research Laboratory. Division of Engineering, Providence, R.I. Apr 1956. 31p graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133446

Fatigue under combined bending and torsion is experimentally investigated and analyzed for SAE 4340 steel at a hardness of Rockwell C-25 and for completely reversed cycles. For each state of combined stress the stress S versus cycle N relations are shown to be expressible by the relation $S = S_e + A(B + N)^{-2.63}$. Contract DA 19-020-ORD-3520, Technical report 1. BU EMRL 4.

Thermal conductivity of 347 stainless steel and zirconium, by L.R. Vianey. Massachusetts Institute of Technology. Dept. of Mechanical Engineering, Cambridge, Mass. Feb 1957. 6p graphs. Order from LC. Mi $1.80, ph $1.80. PB 133385

Average values for thermal conductivity (K) obtained were: 10.0 for 347 stainless steel; 13.4 for zirconium. AD 140931. Will not reproduce well. DIC project 6627.

Transverse mechanical properties of slack-quenched and tempered wrought steel, by John Vajda, Paul E. Busby, Cyril Wells, and Robert F. Mehl. Carnegie Institute of Technology. Metals Research Laboratory, Pittsburgh, Pa. Feb 1954. 48p photos, diagr, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133172

A method is described for developing reproducible slack-quenched structures in heavy steel sections so that transverse mechanical properties obtained after the quench and temper may be associated with hardenability data. The method is applied to several steel compositions to indicate the separate and combined effects of boron, carbon, silicon, and rare earth additions on tensile and impact properties. The effect of mass on the mechanical properties and the influence of degree of slack-quenching on the transistion temperature in the impact test are examined. Cooling rate data are provided so that the structures produced on continuous cooling may be associated with particular cooling rates. AD 33462. Contract AF 33(038)-10218. AF WADC TR 53-515.

Vaporization of compounds and alloys at high temperature, by Paul Goldfinger and Jean Drowart. Brussels. Université Libre. Laboratoire de Chimie Physique Moléculaire, Brussels, Belgium. Oct 1957. 41p graphs (part fold), tables. Order from LC. Mi $3.30, ph $7.80. PB 133279

Dissociation energies of various symmetric diatomic molecules, calculated in this research, together with dissociation energies of previously known molecules, are presented in graphical form, as a function of atomic number Z. Partial decomposition pressures have been measured for the III-V compounds GaAs, InP and the II-VI compounds CdSe and

CdTe. These allow to calculate the heat of formation, the free energy of formation and the standard entropy of these compounds, as well as the dissociation energies of the molecules As_4, P_4, Sb_4, Se_2 and Te_2. Contract AF 61(514)-868, Final technical report. AF OSR TR 58-5.

Welding titanium and a comparison with silver brazing for fabrication of aircraft propeller blades, by J. T. Edwards. General Motors Corporation. Allison Division. Aeroproducts Operations, Dayton, O. Mar 1955. 8p tables. Order from LC. Mi $1.80, ph $1.80. PB 127892

It is concluded that copper brazed steel joints are twice as strong fatigue-wise as silver brazed titanium joints on equal section modulus basis. The sheet thickness of a silver brazed Titanium blade must be increased by approximately 26% to be comparable to a copper brazed 4340 steel blade. Welded Titanium sections made with manganese filler rod compare favorably with SAE 4340 welded sections and with copper brazed steel joints. AD 102030. Engineering report no. 868. For earlier report see PB 133438. Contract NOa(s)-51-829C, Final summary report.

Work function difference of reduced and oxidized gold from contact potential differences with respect to germanium and platinum, by Paul Miller. Pennsylvania. University. Dept. of Physics, Philadelphia, Pa. Dec 1954. 101p photo, diagrs, graphs, tables. Order from LC. Mi $5.70, ph $16.80. PB 130596

An apparatus has been developed for making twenty-five contact potential difference measurements by the Kelvin method in one second. The work function difference between massive polycrystalline gold oxidized by heating in air and gold reduced by heating in hydrogen has been found to be 1.06 ± 0.08 volts, in agreement with a photoelectric determination by Weiss. AD 54977. Thesis - University of Pennsylvania. Contract N6 onr-249(14), Technical report no. 11.

X-ray stress study of non-homogeneous yielding in low carbon steel cylinders, by M. C. Steele and L. C. Eichberger. Illinois. University. Dept. of Theoretical and Applied Mechanics, Urbana, Ill. Dec 1956. 21p diagrs, graphs. Order from LC. Mi$2.70, ph $4.80. PB 133011

A mild steel thick-walled cylinder was overstrained by internal pressure. The non-homogeneous yielding produced a residual stress pattern on removal of pressure. X-ray stress analysis was used to examine the residual stress distribution on an end face of the cylinder. The results were difficult to interpret owing to the severity of cylinder end effects, and the limitations on accuracy of X-ray stress analysis. In general, the residual stress distribution corroborated the expected lack of axial symmetry. A region of comparatively high shear stress existed in advance of the tips of Lueders' lines. ORD project: TB 2-0001(1070). Contract DA 11-022-ord-1527, Technical report no. 7. ILU TAM 111.

METEOROLOGY AND CLIMATOLOGY

Artic. Soviet drifting stations. Translated for Geophysics Research Directorate by American Meteorological Society under Contract AF 19 (604)-1364. Order separate parts described below from LC, giving PB number of each part ordered.

By D. I. Shcherbakov, M. Klenova, and A. G. Dralkin. Translated by Michael Dane. Jun 1955. 24p. Mi $2.70, ph $4.80. PB 133541

Translated from Izvestiia, 27 Jul 1954, 5 Sep 1954 and 12 Nov 1954. Contents: Across the Central Arctic. Travel impressions, by D. I. Shcherbakov. - In the ocean depths. Notes of a Marine geologist, by M. Klenova. - Across five parallels, by A. G. Dralkin. 1. Meteorological research - Arctic regions - Russia 2. Arctic regions - Exploration - Russia

By V. Vavilov, V. Burkhanov and A. F. Treshnikov and others. Translated by Michael Dane and David Kraus. Jun 1957. 50p. Mi $3.30, ph $7.80. PB 133542

Contents: High-latitude flyers (Letchiki vysokikh shirot), by V. Vavilov. - Scientific research in the Arctic in 1954 (Nauchno-issledovatel'skie raboty v arktike v 1954 godu), by V. Burkhanov. - Into the polar night. A letter from the scientific drifting station "North Pole - 3" (V polîarnuiu noch'. Pis'mo s nauchnoi drei-fuîuschêî stantsii "Severnyî Polius - 3"), by A. F. Treshnikov, - Scientific research work in the Central Arctic (Nauchno-issledovatel'skie raboty v tsentral'noi arktike, by V. Burkhanov. - At the Arctic drifting stations (Na drêifuîushchikli stantsiîakh Artiki). Translated from Pravda: Nos. 119, 171, 199, 233, 237, and 283, 1954; no. 96, 1955; and no. 79, 1957, May and Jun 1955, Jun 1957.

Auroral research. Final report under Contract AF 19(122)-152 for the period 6 Jan 1950-31 Jul 1956, by D. M. Hunten, A. Vallance Jones, and B. W. Currie. Saskatchewan. University. Dept. of Physics, Saskatoon, Canada. Aug 1956. 36p Order from LC. Mi $3.00, ph $6.30. PB 127138

The 33 scientific reports and 5 additional papers published under this contract are listed with their abstracts and some comments. These results and others not yet published are briefly discussed. For other reports under this Contract see PB112165 and 112166. AF CRC TR 56-452.

Balloon observations of earth radiations in the infrared, by John Strong. Johns Hopkins University. Laboratory of Astrophysics and Physical Meteorology, Baltimore, Md. Oct 1957. 22p photo, map, diagr, graphs, Order from LC. Mi $2.70, ph $4.80. PB 133989

The present report describes the balloon flight of October 4, 1956 which yielded two spectra of the earth from $\lambda = 7$ to $\lambda = 20$, taken "looking" down from a gondola at 93,000 ft. altitude. The disentanglement of first and second order spectra is reported, and the possiblities of such measurement (now being exploited under a subsequent contract) are described. AD 133847. Contract AF 19(604)-949. AF CRC TR 57-238.

Celestial radio radiation, by John D. Kraus and Hsein Ching Ko. Ohio State University. Dept. of Electrical Engineering. Radio Observatory, Columbus, O. May 1957. 78p photo, diagrs, graphs, tables, maps. Order from LC. Mi $4.50, ph $12.30. PB 132117

Maps of the sky background radio radiation are presented for frequencies from 64 to 910 megacycles. All maps have the same scale, coordinates, and units to facilitate intercomparison and interpolation. A list of more than 50 intense and reliably known discrete radio sources is given with spectra for 11 of the strongest sources for all frequencies at which observations have been made. The maps and source data are preceded by a comprehensive summary of radio astronomy fundamentals including terminology, units, coordinate systems and fundamental relations. AD 117273. Contract AF 19(604)-1591. OSURF Proj 673, Scientific report no. 1. AF CRC TN 57-557.

Classification of solar prominences - II - 1951, by Donald H. Menzel and F. Shirley Jones. Harvard University. Harvard College Observatory. Solar Dept., Cambridge, Mass. n.d. 68p tables. Order from LC. Mi $3.90, ph $10.80. PB 127971

AD 117175. Date is 1956 or later. For Part I see PB 125620. 1. Tables, Meteorological 2. Sun - Prominences 3. Solar phenomena 4. Contract AF 19(604)-1394, Scientific report no. 3 5. AF CRC TN 57-287

Climatological analysis of the fields of flow and temperature in the Mediterranean area, by W. Bleeker. Florida State University. Dept. of Meteorology, Tallahassee, Fla. Jun 1957. 101p maps, graphs. Order from LC. Mi $5.70, ph $16.80. PB 133289

Mean monthly maps for the Mediterranean area are presented for the following parameters: (1) streamlines and isotachs of the surface wind, (2) sea-surface temperature, (3) surface air temperature, (4) difference between air temperature and sea-surface temperature, and (5) vergence of the surface wind field. The maps are accompained by an interpretative discussion. AD 117201. Scientific report 11. Contract AF 19(122)-466. AF CRC TN 57-453.

Computation of precipitation from large-scale vertical motion, by Sigurd J. Smebye. Chicago. University. Dept. of Meteorology, Chicago, Ill. Nov 1957. 49p maps, tables. Order from LC. Mi $3.30, ph $7.80. PB 132939

The vorticity equation, the equation of continuity, and the first law of thermodynamics are used to construct a prediction model which will account for the precipitation due to large-scale vertical motion. The model is tested on seven different synoptic situations in the United States, ranging from major storms with excessive precipitation to minor developments with small amounts. On the whole, the computed patterns of rainfall agree well with those observed. The major deviations are found to be due to convective currents superimposed upon the large-scale motion. AD 146769. Contract AF 19 (604)-2179, Scientific report no. 3. AF CRC TN 57-624.

Diurnal temperature variation of the stratosphere due to radiative processes, by Wan-cheng Chiu. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography, New York, N.Y. Sep 1957. 42p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 132101

From about five years (1952-1956) of radiosonde data over the United States, taken by fifteen radiosonde stations that had been conducting four observations a day, the mean temperatures at the four observational hours were obtained separately for winter and summer at the 200 mb, 150 mb, and 50 mb levels of the stratosphere. After the factors and observational errors that might threaten the success of this detection were carefully examined and discounted, the order of magnitude of the diurnal temperature variation due to radiative processes was given. AD 133819. Project no. 435. Contract AF 19(604)-1755, Scientific report no. 3. AF CRC TN 57-241.

Effect of certain solar radiations in the lower ionosphere, by R.E. Houston, Jr. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. Jul 1957. 81p photos, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 132185

In this report the Chapman theory of ionization production is modified to include the effects of variable scale height, variable recombination, and the dissociation of molecular oxygen as well as solar radiation in several wavelength ranges. The particular radiations considered are Lyman alpha, Lyman beta, and Lyman continuum, and X-radiation in the wavelength range of 40 to 100Å. Also included is a determination of the recombination coefficient by means of sudden ionospheric disturbance, SID, records. A method is pointed out which combines the results of solar flare records with an electron density model, to yield more exact information about the physical processes occurring during a solar flare. AD 113683. Contract AF 19 (604)-1304. AF CRC TN 57-216. PSC IRL TR 95.

Energy budget studies at the earth's surface development of the sonic anemometer for power spectrum analysis, by V. E. Suomi. Wisconsin. University. Dept. of Meteorology, Madison, Wis. Apr 1957. 105p photos, diagrs, graphs, tables. Order from LC. Mi $5.70, ph $16.80. PB 127158

The first section covers measurements obtained from a consideration of energy balance at the earth-air interface. The second section describes the theory and constructional details of a sonic anemometer, whose development was completed under the contract. In an Appendix, circuit and construction details of the sonic anemometer and thermometer are given. AD 117197. Contract AF 19(122)-461. AF CRC TR 56-274.

Final report under Contract AF 19(604)-983. Wentworth Institute, Boston, Mass. Oct 1957. 10p. Order from LC. Mi $1.80, ph $1.80. PB 132946

Services, materials, and facilities were provided by Wentworth Institute for the tabulation and analysis of data derived from various types of records resulting from upper air experiments; for the compilation and correlation of technical data from other sources for use in the interpretation of the results obtained from the experiments, and for the application of correction factors and manipulation of tabulated data by other types of process to transpose them into more significant form. AD 133834. Continuation of research under Contract AF 19(604)-40, see PB 112208-112210 and 123072. AF CRC TR 57-234.

Flight-test investigation of turbulence spectra at low altitude using a direct method for measuring gust velocities, by Charles B. Notess and Grady J. Eakin. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Jul 1954. 62p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 133167

A method was developed for measuring the character of atmospheric turbulence using an airplane as a probe. Random function techniques were utilized to obtain typical power spectral densities of the atmospheric turbulence velocity components. These techniques are based on the application of Norbert Wiener's generalized harmonic theory and John Tukey's sampling theory. An FH-1 aircraft was instrumented and two data runs were made to obtain data at a normal cruise altitude and at a landing approach altitude of 600 feet above the terrain. The data for the landing approach altitude was reduced to evaluate the feasibility of the experimental technique. AD 54620. Contract AF 33(616)-174. AF WADC TR 54-309.

Forecasting for aerial refueling operations at mid-tropospheric altitudes, by James T. Seaver, Jr. and Donald S Huber. U.S. Air Force. Air Weather Service, Andrews Air Force Base, Washington, D.C. Jul 1957. 118p maps, diagrs, graphs, tables. Order from LC. Mi $6.00, ph $18.30. PB 133449

This manual deals mainly with delineating and forecasting cloudiness in the aerial refueling layer from 15,000 to 20,000 feet. These findings are used to develop systematic procedures for forecasting acceptable or unacceptable conditions in the aerial refueling region. The climatology of clouds at aerial refueling altitudes is investigated. AF AWS M 105-52.

Hydromagnetic dynamo theory, by Walter M. Elsasser. Utah. University. Dept. of Physics, Salt Lake City, Utah. Jan 1956. 83p diagrs. Order from LC. Mi $4.80, ph $13.80. PB 127033

Technical report 18 under Contract Nonr-1288(00): Earth's magnetism and magnetohydrodynamics. 1. Magnetohydrodynamics 2. Geomagnetism - Theory 3. Hydromagnetic theory 4. Terrestrial magnetism 5. Waves, Magneto-hydrodynamic - Theory

Instrumentation for the automatic observation of high frequency ionospheric absorption, by S. A. Bowhill, G. R. P. Bulman, and R. Mittra. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. Dec 1957. 51p photos, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 133306

This report deals with instrumentation developed to record automatically the absorption of high-frequency pulsed radio signals in the ionosphere. The observations are currently being made using a visual method of recording. The automatic method has as its basis the measurement of the mean power of the received signal. A slowly-acting feedback loop adjusts the gain of the receiving equipment to keep the mean power constant. The gain control characteristic of the receiver permits the display of the absorption (in decibels) linearly on a pen recorder. Complete descriptions of the various parts of the equipment are given, and preliminary results obtain-

ed by the visual method are illustrated. AD 146844. Contract AF 19(604)-1304. PSC IRL SR-98. AF CRC TN 58-204.

Investigation of atmospheric radio noise. Scientific report no. 16 covering period 1 Apr-30 Jun 1957, under Contract AF 19(604)-876, by J. E. Blanton and D. F. Mooney. Florida. Engineering and Industrial Experiment Station, Gainesville, Fla. Aug 1957. 25p photos, diagrs (1 fold), table. Order from LC. Mi $2.70, ph $4.80.
PB 133183

A complete description of the UF/LSR-1, Lighting Stroke Recorder is given. Diagrams and photographs are included to clarify the operation of the unit. Explanations of the changes made since the device was first proposed are given, and improvements which may be incorporated in future models are discussed. AD 133632. AF CRC TN 57-587.

Investigations of mountain lee waves and the air flow over the Sierra Nevada, by Jörgen Holmboe and Harold Klieforth. California. University. Dept. of Meteorology, Los Angeles, Calif. Mar 1957. 278p photos, maps, diagrs, graphs, tables. Order from LC. Mi $11.10, ph $44.10.
PB 132045

A summary of earlier work is given in the final report of the Sierra Wave Project (Contract AF 19(122)-263). The further analysis of the observations and the symoptic analysis of the cross-mountain flow patterns were continued and the results are discussed in this final report. Also included is a discussion of the observations from a later field investigation in the spring of 1955. AD 113606. Contract AF 19(604)-728, Final report. AF CRC TR 57-204.

Investigations on the heat balance of the troposphere, by Günther Korb, Johannes Michalowsky, and Fritz Möller. Johannes Gutenberg Universität. Meteorologisch-Geophysikalisches Institut, Mainz, Ger, Aug 1956. 95p maps, graphs, tables. Order from LC. Mi $5.40, ph $15.30.
PB 127016

A partial revision of the method for the computation of the long wave radiation loss of the troposphere, given by Moller (1954), is carried out. Correction factors are computed, considering the influence of cloud covers. The energy amounts observed from the solar spectrum by each of the near infra-red water vapor bands are determined from laboratory measurements of the short wave absorption. From this absorption function daily sums of the short wave absorption depending on water vapor content, geographic latitutde and declination of the sun are computed and tabulated. Determining the absorption of clouds the equations of Schuster-Mecke-Albrecht are solved again. With these coefficients and with statistical information on the cloud distribution and thickness given by Skierlo (1940) and Peppler (1941) and on size and number of droplets by Diem (1948) for some frequently appearing cloud types, transmission, reflection and absorption are computed and represented graphically. As a consequence of these computations a method for the theoretical calculation of the radiation balance at the earth's surface can be given. AD 110224. Contract AF 61(514)-863, Technical report no. 1. AF CRC TN 56-881.

Jet stream and long waves in a steady rotating dishpan experiment. Part I: Structure of the circulation, by Herbert Riehl and Dave Fultz. Chicago. University. Dept. of Meteorology, Chicago, Ill. Aug 1956. 22p diagrs. Order from LC. Mi $2.70, ph $4.80.
PB 128084

The three-dimensional structure of the flow in a steady rotating three-wave dishpan experiment is computed and compared with the atmosphere. First the experiment and methods of comparison between dishpan and atmosphere are described. Then motion and vorticity at the top surface are shown; trajectories leading from equatorial to polar rim of the pan are found. Next the three-dimensional temperature field is determined, and from this, geostrophic motion at all depths. Contract AF 19(604)-1292, Scientific report no. 1 and Contract N6 ori-020(36), NR 082-120.

Kinematics of precipitation echoes, by Lloyd E. Jacobs. Texas. Agricultural and Mechanical College. Dept. of Oceanography and Meteorology College Station, Tex. Nov 1957. 16p maps, diagr, tables. Order from LC. Mi $2.40, ph $3.30.
PB 133259

The subject of this paper was suggested as a result of a radar storm study made by some meteorological students at Texas A. & M. In their analysis it was noted that observation of the several motions, internal and external, of a given discrete storm system could reveal (at least in some cases) the side of the storm system into which moisture-laden air was entering. This perception suggested the possibility of further increasing the usefulness of radar observations to the meteorologist. That is, in addition to yielding information concerning the location, velocity, nature, height, intensity, etc. of a storm system , the radar observation might also shed some direct light on the exact reason or reasons why and how the storm developed. A & M project: 131. Contract AF 19(604)-1564, Technical note no. 3.

Low-level inversions. Final report under Contract DA 19-129-QM-377, by James M. Austin. Massachusetts Institute of Technology. Dept. of Meteorology, Cambridge, Mass. Sep 1957. 153p maps, diagrs, graphs, tables. Order from LC. Mi $7.40, ph $24.80.
PB 132854

The effect of the presence of various types of inversions on temperature change was explored. An ob-

jective method of predicting temperature change and inversion modification, using area on an equal-area energy diagram as a measure of intensity is proposed. Project 7-83-05-003B.

Lunar radiation at a wavelength of 2.2 cm, by C.J. Grebenkemper. U.S. Naval Research Laboratory. Jun 1958. 12p diagrs, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 130503

Measurements of microwave radiation of the moon were made using the NRL 50-ft paraboloid antenna at a wavelength of 2.2 cm. Observations were obtained for five days which happened to be spaced in the lunar cycle so as to provide a preliminary indication of the variation of the apparent lunar temperature with phase. The mean brightness temperature of the moon was found to be approximately 200°K ±5 percent, which is slightly higher than that previously reported at 8.6-mm wave-length. The variation of brightness temperature with phase is less at 2.2 cm than that for higher frequencies and is found to be roughly ±5 percent of the mean temperature. NRL R 5151.

Mathematical model of the gravity field surrounding the earth, by C.J. Cohen. U.S. Naval Proving Ground, Dahlgren, Va. Feb 1957. 21p. Order from LC. Mi $2.70, ph $4.80. PB 133004

In connection with the predication of trajectories of ballistic missiles and earth satellites, formulae are derived for the gravity field surrounding the non-spherical earth. These formulae are based on the characterization of the free surface of the earth as an oblate spheroid. No further assumptions regarding the mass distribution within the earth are required. Closed form solutions as well as series expansions are presented for the potential, the force components, and g at the earth's surface. The various constants and coefficients in the expressions are evaluated numerically on the basis of the international conventions for the figure of the earth and for gravity at the equator. NPG R 1514. NAVORD 5135.

Mean monthly temperature, pressure and wind fields in the lower stratosphere and upper troposphere over North America, by Wan-cheng Chiu, Solomon Hellerman and Richard S. Greenfield. Air Transport Association of America. Meteorological Committee. Aug 1956. 400p maps. Order from LC. Mi $11.10, ph $60.60. PB 132867

D. A. project 3-17-02-001. Signal task 1052A.
1. Stratosphere - Temperature - Measurement
2. Stratosphere - Pressure - Measurement
3. Winds, Stratospheric 4. Atmosphere, Upper - Temperature - Measurement 5. Winds, Tropospheric 6. Contract DA 36-039-sc-64673

Mean monthly 300 and 200-mb contours and 500, 300, and 200-mb temperatures for the Northern Hemisphere, by Eberhard W. Wahl. U.S. Air Force. Air Research and Development Command, Cambridge Research Center. Geophysics Research Directorate, Bedford, Mass. Apr 1958. 84p maps. Order from OTS. $2.25. PB 131979

Mean monthly contour and temperature charts have been prepared from data compiled in the monthly publication "Climatic Data of the World." These charts are based upon a 6-year period (1950 thru 1955) and they represent features of the temperature at 500, 300, and 200 mb and pressure height distributions at 300 and 200 millibars. The construction of these charts is discussed briefly and some general remarks are made on the large-scale behavior of these data. AD 146861. AF CRC TR 58-207. AF GRD P 57.

Measurements of the energy absorption in radiation fields of electron sources, by A. E. Grün. Max-Planck Institut für Physik der Stratosphäre. Hochspannungslaboratorium Hechingen, Göttingen, Germany. n.d. 19p diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 127160

The energy absorption $\alpha(z)$ of air in the radiation field of a special electron source was measured as a function of the penetration depth z (depth dose curves). As a measure of the absorption the luminescence of air was used. The electron source delivered an electron beam that was transferred from the vacuum into the air by dynamical pressure stages. The energy loss -dE/ds of the electrons taken from the measured curves, are in good accordance with Bethe's theory. AD 120471. Date is 1955 or later. Technical note no. 1. Contract AF 61 (514)-911. AF OSR TN 57-118.

Meteor distribution and cratering, by John S. Rinehart. Smithsonian Institution. Astrophysical Laboratory, Cambridge, Mass. Oct 1957. 24p photo, diagr, graph, table. Order from LC. Mi $2.70, ph $4.80. PB 132976

This conference is concerned mostly with man's efforts to project missiles at very high velocities and to study the effects of their impact against various targets. The concepts and data fall within two main disciplines: astronomy and terminal ballistics. Specifically, the report indicates the nature and distribution of meteoric particles, and discusses some of the physical aspects of penetration mechanics. AD 136693. Paper presented at the Hypervelocity and Impact Effects Symposium held at Naval Research Laboratory, 22-24 May 1957. Contract AF 18(600)-1596, Technical report no. 3. AF OSR TN 57-700.

Meteorological utilization of images of the earth's surface transmitted from a satellite vehicle, by Arnold H. Glaser. Harvard University. Blue Hill Meteorological Laboratory, Milton, Mass. Oct 1957. 153p photos, maps, diagrs, graphs,

tables. Order from LC. Mi $7.50, ph $24.30. PB 133297

It is shown that limitations of communication channel capacity, caused by practical limitations on transmitter power and bandwidth, limit the inage resolution that can be achieved with foreseeable technological developments from an economically practical satellite to about 1 mile. Practical image-forming systems more readily available are likely to have resolutions more of the order of 5 miles. Some 30-50 gradations of brightness may be distinguished in a typical feasible system, which must be assigned to the rather large range of brightnesses encountered at different solar angles and with varying cloud covers. AD 146764. Contract AF 19(604)-1589, Phase 2. AF CRC TR 57-241.

Moisture analysis and water budget in some non-developing cases, by Dorothy L. Bradbury. Chicago. University. Dept. of Meteorology, Chicago, Ill. Nov 1957. 14p maps, graph. Order from LC. Mi $2.40, ph $3.30. PB 132812

The water budget was computed twice daily over a large area of central and eastern United States for a two-week period. With the use of the simplified water balance equation fairly good agreement was found between the computed and observed amounts of precipitation. The patterns of water vapor storage were compared with those of the observed precipitation and it was found that, in general, the axes of the maximum precipitation areas lie on or to the left of the axes of the patterns of water vapor storage. AD 146770. Contract AF 19(604)-2179, Scientific report no. 4. AF CRC TN 57-625.

Mollier chart for air in dissociated equilibrium at temperatures of 2000°K to 15000°K, by I. Korobkin and S. M. Hastings. U.S. Naval Ordnance Laboratory, White Oak, Md. May 1957. 47p fold graphs. Order from LC. Mi $3.30, ph $7.80. PB 133949

1. Mollier diagram 2. Air - Thermodynamic properties 3. NOL ARR 368 4. NAVORD R 446

Neumann bands in stony-iron meteorites, by Robert R. O'Neil and John S. Rinehart. Smithsonian Institution. Astrophysical Observatory, Cambridge, Mass. Dec 1957. 8p photos. Order from LC. Mi $1.80, ph $1.80. PB 132983

AD 136742. 1. Meteorites - Lamellae 2. Neumann bands (Meteorology) 3. Contract AF 18(600)-1596, Technical report no, 6 4. AF OSR TN 57-753.

Numerical investigation of certain features of the general circulation, by Kirk W. Bryan, Jr. Massachusetts Institute of Technology. Dept. of Meteorology, Cambridge, Mass. Dec 1957. 81p graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 133174

A special two-layer, quasi-geostrophic meteorological model, which contains a variable static stability and approximations for non-adiabatic effects, has been reduced to a constrained system in which all but certain large scale motions have been filtered out. Numerical integrations of the system carried out on an electronic computer have been divided into two experiments. The solutions were characterized by a steady baroclinic wave of large amplitude in, or nearly in, equilibrium with the zonal flow. AD 146772. Statistical forecasting project, Scientific report no. 4. For report no. 1 see PB 126724. Contract AF 19(604)-1566, Scientific report no. 4. AF CRC TN 57-627.

Numerical investigations of temporal change of spectral distribution of kinetic energy in a two dimensional nondivergent and frictionless current, by F. Wipperman. Germany. Wetterdienst. 1956? 21p graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 125117

Stepwise integration of the vorticity equation for barotropic flow permits the computation of spectral distribution of kinetic energy for specific points of time. Investigated is the question of a special quasistationary spectral distribution; hereby occurs, after some 4 days for several arbitrary selected initial spectral distributions the shape of a double maximum as observed in the atmosphere. Technical note no. 3. Contract AF 61(514)-735-C. AF CRC TN 56-291.

On the atmospheric circulation at 500-mb in the auroral belt, by Herbert Riehl. Chicago. University. Dept. of Meteorology, Chicago, Ill May 1954. 18p diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 126977

Covers period Dec 1954-Jun 1955. Initiated and partly carried out under sponsorship of the Munitalp Foundation. 1. Atmosphere - Circulation - Troposphere 2. Winds, Tropospheric - Velocity 3. Contract N6 ori-020(36), NR 082-120

On the meridional circulation and release of kinetic energy in the tropics, by E. Palmén, H. Riehl, and L. Vuorela. Chicago. University. Dept. of Meteorology, Chicago, Ill. Feb 1957. 21p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 132535

1. Meteorology, Tropical - Research
2. Atmosphere - Turbulence - Dynamics
3. Contract N6 ori-020(36), NR 082-120

On the relation between photometric observations and geometric positions of the sun and moon during a solar eclipse. Paper II: Eclipse of 25 Feb

1952 as observed at Khartoum, by Vera Cooper Rubin. Georgetown University. Georgetown College Observatory. Sep 1957. 15p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132197

AD 133804. Georgetown Observatory Monograph no. 6. 1. Eclipses, Solar - Calculation 2. Eclipses, Solar - Khartoum, India 3. Contract AF 19(604)-880, Technical report no. 8 4. AF CRC TN 57-231

On the theory of large-scale nearly-horizontal motions in the atmosphere, by George K. Morikawa. New York University. Institute of Mathematical Sciences, New York, N.Y. Feb 1956. 46p. Order from LC. Mi $3.30, ph $7.80. PB 126899

In Part I of this paper, approximate flow equations are derived incorporating the hydrostatic, geostrophic and low-velocity approximations with the simplest possible model which is a physically-meaningful description of some atmospheric (and oceanic) motions. In Part II, the physical system described by the lowest order of approximation is studied. Contract N6 ori-201(01). NYU IMM 226.

Origin of deep ellipsoidal pits on large iron meteorites, by Robert R. O'Neil and John S. Rinehart. Smithsonian Institution. Astrophysical Observatory, Cambridge, Mass. Dec 1957. 11p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 132982

AD 136741. 1. Meteorites - Orientation 2. Contract AF 18(600)-1596, Technical report 5 3. AF OSR TN 57-752

Predicting infrared molecular attenuation for long slant paths in the upper atmosphere. Scientific report no. 1, under Contract AF 19(604)-2405, by Robert O'B. Carpenter, Julia A. Wight, Antonio Quesada, and Richard E. Swing. Baird-Atomic, Inc., Cambridge, Mass. Nov 1957. 69p diagr, graphs (1 fold), table. Order from LC. Mi $4.50, ph $12.30. PB 132898

A simple, practical, and reliable procedure is given for the calculation of predicted infrared molecular attenuation for almost any path in the atmosphere, slant or otherwise, of any length. A detailed survey is given of the arguments as to the procedure for properly accounting for the effect of pressure broadening along paths of variable pressure and temperature. All calculations are based on the ARDC Model Atmosphere 1956, and simple procedures for correcting to existing weather conditions are given. J.O. no. 5146.

Preliminary study of atmospheric gust conditions at low altitude, by James O. Barrett. Northrop Aircraft, Inc., Experimental Flight Test Dept., Hawthorne, Calif. Oct 1957. 142p photos, map, graphs (part fold), tables. Order from LC. Mi $7.20, ph $22.80. PB 133978

Analysis of airplane motions and resulting stresses during flight through atmospheric turbulence is one of many problems involved in the design of an airplane. In order to solve this problem, the designer must first have a description of the turbulence. The objective of this program was to establish data reduction techniques and test procedures for statistically evaluating the atmospheric turbulence found at low altitudes. AD 142015. Project 1367, Task 13636. Covers period 19 Mar 1956-1 Apr 1957 under Contract AF 33(616)-3563. AF WADC TR 57-253.

Preliminary survey of the field of ultraviolet radiation, by Donald Keith Berkey and Ruth Silverman. U.S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N.Y. Feb 1957. 25p diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 127214

This report presents a discussion of research accomplished in the ultraviolet (uv) field. The methods used to explore the near, intermediate, and far uv regions are examined, and upper atmosphere investigations are covered, as are various methods of measuring wavelengths. AD 97902. Project no. 4512. AF RADC TR 57-26.

Relative importance of different heat exchange processes in the lower stratosphere, by Wan-Cheng Chiu and Richard S. Greenfield. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography, New York, N.Y. Dec 1957. 41p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133304

The temperature variation at a fixed point in the free atmosphere or at a point which moves vertically with an isobaric surface is a result of the combined effect of radiation, horizontal advection of heat, vertical convection of heat, and other heat exchange processes. A method is presented by which the 12 hour local temperature changes that would have resulted from radiative processes alone may be estimated. This method and the conventional method of determining the 12 hour local temperature change due to the horizontal advective process lead to a way of estimating the relative importance of different heat exchange processes. AD 146771. Project 435. Contract AF 19(604)-1755, Scientific report no. 2. AF CRC TN 57-626.

Research on detection of hidden crevasses in glacier ice. Final report under Contract DA 44-009-ENG-2315, by John C. Cook. Southwest Research Institute. Dept. of Electrical Engineering. Geophysical Engineering Section, San Antonio, Tex. Jan 1956. 138p photos, drawings, diagrs, graphs,

tables. Order from LC. Mi $6.90, ph $21.30. PB 133059

The Interim Technical Report, in which the literature study and field tests performed in the first phases of this project are reported in detail, is briefly summarized. Electromagnetic model work, theoretical work, and equipment developed in preparation for further field work are described. Field data obtained in 1955 with balanced RF arrays, VHF beams, and radio field strength equipment are briefly presented and analyzed. A detailed account is given of the development and testing of the Surface Electrode Audio Frequency system which has proved to be an effective mobile crevasse detector. Design recommendations for SEAF systems are given. ERDL project 8-98-09-002A.

Research on moon echo phenomena, by J. V. Evans. Manchester. University. Jodrell Bank Experimental Station, Macclesfield, Cheshire, England. May 1957. 32p diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 133173

The research work reported in this note is concerned with two separate phenomena, viz. (a) the long period fading of radio echoes reflected from the moon, which is caused by the magneto-ionic effect in the earth's ionosphere and (b) the rapid fading of the echoes which is produced by the libration of the moon. AD 133650. Covers period 1 May 1956-30 Apr 1957 under Contract AF 61(514)-947. Technical note no. 1. AF CRC TN 57-598.

Research study on intensity of surface precipitation using radar instrumentation. Final report for the period 1 Jun 1952-30 Jun 1955, under Contract DA 36-039-sc-42446, by F. A. Huff. Illinois State Water Survey. Meteorologic Laboratory, Urbana, Ill. Jul 1955. 39p tables. Order from LC. Mi $3.00, ph $6.30. PB 127047

This report presents a summary of research accomplished under Contract DA-36-039-SC-42446 between 1 June 1952 and 30 June 1955. Detailed discussion of the various phases of the project, concerned with the use of radar for quantitative precipitation measurements, have been omitted, since they have been amply covered in six research reports. Dept. of the Army project: 3-99-07-022. Signal Corps project: 24-172B. 1. Radar - Meteorological use 2. Precipitation - Effect on radar signals 3. Precipitation - Radar analysis 4. Rain drops - Measurement - Radar

Scientific report no. 8, covering period 1 Apr-30 Jun 1957, under Contract AF 19(604)-1491, by James W. Wareick and Harold Zirin. Colorado. University. High Altitude Observatory, Boulder, Colo. Sep 1957. 11p photos, diagr. Order from LC. Mi $2.40, ph $3.30. PB 133064

The report presents a series of illustrations of the antenna structures designed and constructed as a part of the activity under this and the companion Contract (now completed except for the final report), AF 19(604)-1503. The problem of numerical reconstruction of the course of ionizing flux through an SCNA (Sudden Cosmic Noise Absorption) was programmed and partially run on Maniac II, at Los Alamos, New Mexico. General remarks on this program and preliminary results are included. AD 133747. For reports nos 1-4 and 6 see PB 122219-122221, 124776 and 126519. AF CRC TN 57-792.

Study of the large-scale spectra of atmospheric kinetic energy, wave speed, momentum flux and heat flux. Technical report 9, under Contract Nonr 1600(00), by Robert M. Henry and Seymour L. Hess. Florida State University. Dept. of Meteorology, Tallahassee, Fla. Mar 1957. 35p maps, graphs, table. Order from LC. Mi $3.00, ph $6.30. PB 132643

1. Atmosphere - Energy 2. Atmosphere - Flux - Measurement 3. Atmosphere - Spectrographic analysis 4. Atmosphere - Thermodynamic properties - Theory 5. Contract Nonr 1600(00), NR 082-071, Technical report no. 9

Study to determine applicability of incremental modulations for communicating weather data. Final progress report, FPR 75-1, under Contract AF 19(604)-1385. Cook Electric Co. Cook Research Laboratories, Chicago, Ill. Aug 1957. 127p diagrs (part fold), graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 132947

The study to determine applicability of incremental modulations for communicating weather data has led to the formulation of pulse width modulation techniques for transmitting digital as well as continuous data. In the search for optimum modulation techniques, specifications for a modulation scheme to obviate the major difficulties met in the efficient processing and communication of weather data have been found to be: (1) conservation of transmission time, (2) optimization of the amount of information that can be transmitted over conventional long haul media, and (3) features that lead to automatic and visual processing of meteorological data. AD 146763. Cook project P-826. AF CRC TR 57-240.

Suggested uses of meterological data collected by constant-pressure level balloon systems, by Arie Gaalswyk. General Mills, Inc. Mechanical Division. Research Dept., Minneapolis, Minn. Feb 1958. 61p diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 133245

The purpose of this report is to present a "State of Art" on the operational use of meteorological data which can be gathered by a constant pressure-level balloon (CPB) system. Constant-pressure-level balloons carrying meteorological sensing instruments are found to be useful for gathering meteorological data over remote areas with sparse radiosonde data

coverage. Nomograms have been devised which permit processing wind data from the reported positions systematically and in rapid order. AD 146865. Project 80070. Contract AF 19(604)-2170. AF CRC TN 58-214.

Summary of weather observations made at Holloman Air Force Base from Sep 1942 through Oct 1956, by James R. Berry. U.S. Air Force. Air Research and Development Command, Holloman Air Development Center, Holloman Air Force Base, New Mexico. Nov 1956. 48p tables. Order from LC. Mi $3.30, ph $7.80. PB 126970

AD 113033. 1. Tables, Meteorological 2. Precipitation - Measurements 3. AF HADC TR 57-2

Theory of stellar variability. III" (Phase displacement between the brightness variations and radical velocity variations of Cepheids and long-period variables) ("K teorii zvezdnoi peremennosti. III" (O sdvige fazy mezhdu kolebaniiami bleska i kolebaniiami luchevoi skorosti u tsefeidi u dolgoperiodicheskikh peremennykh), by S. A. Zhevakin. Translated by David Kraus and Michael M. Dane. Oct 1955. 45p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 132742

Taking as a basis the theory that the autopulsations of stars are excited by a zone of critical ionization of He II and using a discrete single-layered model of the ionized zone that executes nonadiabatic pulsations, it is shown that when the pulsations of the ionized zone reach a certain stage of nonadiabaticity there occur simultaneously in the zone: 1) negative dissipation sufficient to excite autopulsations of the star and 2) a phase lag of approximately one quarter of a pulsation period between the maximum radiant flux and the maximum compression of the star. Part I issued in Astro. zhurn. 30:161, 1953; For Part II see PB 119368. Translated from Astronomicheskii zhurnal, 31(4): 335-357, 1954, for Geophysics Research Directorate by American Meteorological Society under Contract AF 19(604)-1936.

Utilization of energy stored in the upper atmosphere, by Paul Harteck and Robert R. Reeves, Jr. Rensselaer Polytechnic Institute. Dept. of Chemistry, Troy, N.Y. Jul 1957. 66p diagrs, tables. Order from OTS. $1.75. PB 131580

The work has been divided into two parts. First, an investigation to develop a flying missile, now called the HARE. The HARE is to fly through the upper atmosphere within the region where oxygen atoms are present and most dense. The HARE is to be propelled by energy obtained by recombination of these atoms on a catalytic surface placed inside. The investigation included determination of a catalyst for the recombination, materials of construction, and various calculations indicating the feasibility of such a missile. Further equipment has been obtained to test various models of the HARE under simulated flight conditions. As a second, more recent, part of the work a study has been started to determine more precisely the maximum oxygen atom concentration in the upper atmosphere. AD 136421. Project no. 1115. Contract AF 18(600)-1336. AF OSR TR 57-50.

Water balance of the earth, by T. E. A. van Hylckama Drexel Institute of Technology. Laboratory of Climatology, Centerton, N.J. 1956. 81p diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 133400

Based upon data from 14,000 locations throughout the world. Data is figured between areas of 70° latitude, North and South. Polar areas' data was too scant. Publications in Climatology, vol. 9, no. 2. For technical report 1 see PB 129690 Contract Nonr-1617(00), NR 389-101, Technical report no. 2.

MINERALS AND MINERAL PRODUCTS

Ceramic crucible for melting titanium, by Berthold C. Weber, William M. Thompson, Hans O. Bielstein and Murray A. Schwartz. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, O. Sep 1956. 62p photos, diagr, tables. Order from LC. Mi $3.90, ph $10.80. PB 133206

Research studies have resulted in the development of an oxygen deficient zirconia material modified in a novel way to make it thermally stable and inert against the attack of molten titanium. It was possible to melt titanium in this crucible with no significant increase in hardness. However, limitations regarding overheating and soaking must be taken into account. AD 97285. Project 7350, Task 70634. AF WADC TR 56-372.

Development and evaluation services on ceramic materials and wall composites for high-temperature radome shapes, by John J. Dorsey. Mallory, P. R. & Company, Inc. Corporate Research Laboratories, Indianapolis, Inc. Feb 1958. 21p photos, table. Order from OTS. 75 cents. PB 131987

Various flame spraying methods which might be used to fabricate a radome from inorganic or ceramic materials where investigated. Numerous compositions were mixed and flame sprayed. Silica, alone or with additions, was the only material which could be fabricated into a hard, dense deposit. Alumina and other miscellaneous compositions were also flame sprayed but in all cases, the deposits were either full of laminations and voids or cracking occurred on cooling. Means of obtaining more uniform deposits were investigated. Bars were cut from large flame

sprayed deposits in order to observe the uniformity obtained with the flame spray technique. A brief, but comprehensive, summary of all experimental results is given at the end of the report. AD 150965. Project 7350, Task 73500. Covers period 15 Feb 1956-6 Sep 1957 under Contract AF 33(616)-3397. AF WADC TR 57-665.

Development of fibrous glasses having high elastic moduli. Part II, by J. A. Waugh, V. E. J. Chiochetti, H. I. Glaser, and R. Z. Schreffler. Owens-Corning Fiberglas Corporation, Newark, O. May 1958. 19p diagr, graph. Order from OTS. 50 cents. PB 131927

This report describes the work done to draw fiberized glass having a high modulus of elasticity, from two kinds of glass cullet; that containing calcium aluminate and that containing beryllium oxide. In the initial evaluation program, six (6) different bushings were used incorporating eight (8) different tip designs of modifications in an effort to fiberize calcium aluminate glass cullet. Results were generally unsuccessful. In the subsequent (Supplemental Agreement) evaluation regarding beryllium oxide glass cullet, one (1) bushing incorporating two (2) different tip designs was used in the attempted fiberization. Results were generally successful. AD 155502. Project 7340, Task 73400. Covers work from Mar 1956-Jul 1957 under Contract AF 33(616)-2422, Suppl. agreement S4(57-1533). For Part 1 see PB 111789. AF WADC TR 55-290, Part 2.

Dielectric analysis of ferrites and their appraisal as radome materials, by Arthur R. von Hippel, William B. Westphal, and Perry A. Miles. Massachusetts Institute of Technology. Laboratory for Insulation Research, Cambridge, Mass. Feb 1955. 186p diagrs, graphs, tables. Order from LC. Mi $8.40, ph $28.80. PB 132246

An extensive theoretical and experimental investigation has been undertaken on the electric and magnetic response of ferrites from static fields up to the frequencies of the optical region. Theory is formulated on the polarization and magnetization of dielectrics. Molecular and magnetic structure of ferrites is discussed, dielectric analysis by resonance spectra and by relaxation spectra; polarization, conduction and magnetic properties of ferrites; and data is evaluated for radome applications. Project 4158, Task 41771. Contract AF 33(616)-2191. AF WADC TR 55-149.

High-temperature dielectric measurements on radome ceramics in the microwave region, by W. B. Westphal. Massachusetts Institute of Technology. Laboratory for Insulation Research Cambridge, Mass. Jan 1957. 24p diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133375

The dielectric constant and loss of certain ceramics have been measured up to peak temperatures ranging from 500° to 1200°C with a view of the possible use of some of them as radome materials. Their characteristics are compared with those of certain glasses and crystals. A high-purity alumina ceramic having k' = 9.32 and tan = 0.00015 at 25°C with changes of 10.4 and 0.0011 at 1200°C and 50 kMc proved to be outstanding as a low-loss material. Some special techniques using the standing wave method in shorted wave-guides are discussed briefly. Contract Nonr-1841(10). MIT LIR TR 113.

Investigations and measurements of properties of single-crystal silicon. Battelle Memorial Institute, Columbus, O. Contract AF 19(604)-1852. Order separate parts described below from OTS, giving PB number of each part ordered.

Scientific report no. 2: Measurements of bulk lifetime in silicon, by E. Brock Dale, Roger Beck, C. S. Peet, and A. C. Beer. May 1957. 33p photos, diagrs, graphs. $1.00. PB 131585

Four methods of measuring the lifetime of nonequilibrium carriers in silicon have been evaluated. These are (1) pulse delay method, (2) double pulse method, (3) Fan-Nisenoff method and (4) photoconductivity decay method. Only the last of these was found to combine the virtues of simplicity, reproducibility, and meaningfulness of results. Improvements and refinements of the photoconductivity decay apparatus were made, resulting in sufficient reproducibility to enable a critical evaluation of computational and experimental procedures. AD 117072. For Scientific report no. 1 see PB 128751. AF CRC TN 57-370.

Final report, by A. C. Beer and associates. Sep 1957. 20p diagrs, graphs. 50 cents. PB 131586

Investigations were made of methods for determining minority carrier lifetime, resistivity, and charge carrier density and mobility in silicon crystals. Appropriate modifications of measurement techniques were developed to provide good reliability combined with simplicity of operation and ease of application to a given specimen. Four methods of measuring minority carrier lifetime in silicon were investigated and are compared on the basis of suitability as a standard method. The Photoconductivity Decay Method was found to be the most promising as regards all-round suitability. A study of the details of this method disclosed several precautions which must be observed to obtain reproducible and meaningful values of the lifetime. Special attention is given to the variation of lifetime with injection level in p-type silicon. For measurements of resistivity, either electroforming or plating procedures were perfected for overcoming

difficulties from rectifying contacts and surface oxide films. The profiling of the Hall mobility along a crystal is accomplished with four potential probes arranged in a diamond array, using methods similar to those adopted for the resistivity probes for eliminating contacting difficulties. AD 133736. Covers period 1 Apr 1956 - 30 Sep 1957. AF CRC TR 57-355.

Investigations of surface properties of silicon and other semiconductors, by H. E. Farnsworth, J. A. Dillon, Jr., and R. E. Schlier. Brown University. Dept. of Physics, Providence, R.I. Dec 1957. 14p photos, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133295

Low-energy electron diffraction work for the (111) silicon crystal has been extended. An effect which appeared to be due to a charging of the crystal by the primary-electron beam is described. Effects of radiation quenching and annealing of the crystal on the diffraction pattern have been observed. After annealing at 600°C, fractional-order beams were observed in the (110) azimuth which correspond roughly to a surface spacing seven times that of the silicon spacing. When the crystal was quenched by radiation cooling from 1000°C, the intensities of the fractional-order beams were decreased by 70 to 80% while the integral-order beams were decreased by less than 50%. AD 133790. Scientific report 5. Covers work from 1 Sep 1957-30 Nov 1957 under Contracts AF 19(604)-1952 and AF 19 (604)-458, Subcontract 12. AF CRC TN 57-973.

Joining of titanium carbide-nickel cermets, by Malcolm Basche, Romeo G. Bourdeau and John Wulff. Massachusetts Institute of Technology, Cambridge, Mass. Jan 1954. 21p photos, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 133199

Titanium carbide-nickel cermets can be welded to cobalt alloys or stainless steel by employing the technique of first diffusing nickel into the cermets at temperatures above 1300°C to obtain a graded zone and then joining at 1275°C or lower to the base alloy. By this technique welds can be made to have transverse rupture strengths over 130,000 psi. AD 43061. Contract AF 33(616)-61. AF WADC TR 54-211.

Kinetics of decomposition of calcium carbonate and barium carbonate, by C. N. Satterfield and F. Feakes. Massachusetts Institute of Technology. Department of Chemical Engineering, Cambridge, Mass. Mar 1957. 61p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 133401

Division of Sponsored Research Project 7476. 1. Hydrogen peroxide - Production 2. Calcium carbonate - Decomposition 3. Barium carbonate - Decomposition 4. Contract Nonr 1841(11), NR 092-008, Report 51

Measurements of dielectric, elastic and piezoelectric constants of barium titanate ceramics, by H. H. A. Krueger and Don Berlincourt. Clevite Corporation. Clevite Research Center, Cleveland, O. Sep 1956. 31p diagrs, tables. Order from LC. Mi $3.00, ph $6.30. PB 128009

Project 60112-G. Includes "Axial compliance and coupling coefficient of a polarized ferro electric ceramic in terms of the anti resonance and resonance frequencies of an axially polarized bar of square cross section, by Hans G. Beerwald. Report no. BL 556. Feb 1955. 1. Ceramics, Barium titanate - Electric properties 2. Ceramics, Barium titanate - Piezoelectric properties 3. Ceramics, Barium titanate - Electro mechanical properties 4. Contract Nonr-1055(00), Technical report no. 11

Note on the measurement of differential phase shift of nicrowave ferrites, by Isidore Bady. U.S. Signal Corps Engineering Laboratories, Fort Monmouth, N.J. Oct 1956. 10p diagr, graph, table. Order from LC. Mi $1.80, ph $1.80. PB 132472

Mismatches in the test equipment can cause considerable error in the measurement of differential phase shift. A particularly important source of error is analyzed and the equation derived for it in terms of the mismatch. SCEL TM 1830.

Relative effectiveness of barricade window materials and support area, by S. A. Wisneski and A. Kush. U.S. Picatinny Arsenal. Industrial Engineering Division, Dover, N.J. Apr 1957. 16p photos, diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 133257

This report considers the determination of optimum transparent window material and its support area. Tests were made of 3/4-inch-thick samples of safety glass, lucite, and of 1/2-inch-thick and 5/8-inch-thick butacite-corded lucite, comprising a layer of polyvinyl butyral sandwiched between two layers of lucite. PA TR PD 501-7. PA DB TR 2-57.

Research on growing single crystals of ceramic materials with ferrimagnetic properties. Scientific report no. 2 covering period 1 Jul-30 Sep 1957, under Contract AF 19(604)-2261, by A.J. Marino, Jr., D.C. Seeley, and J.W. Brogan. Federal Telecommunication Laboratories. Physical and Chemical Laboratory, Nutley, N.J. Oct 1957. 20p photos. Order from LC. Mi $2.40, ph $3.30. PB 132942

Single crystals as presently grown are far from perfect. To reduce these imperfections, or to be able to control the types and their numbers, a method of equilibrium cooling (slow cooling) is needed. With the aid of r-f heating, it is possible to cool the crystal slowly from solidus temperature to room temperature. Choice of proper generator, frequency operation, power settings, and work coil design

were determined experimentally for ferrites. To measure the temperature changes and check the uniformity of r-f heatings, photographic pyrometry was chosen. AD 133742. Scientific report 2. AF CRC TN 57-788.

Study in bonding: Metal to glass to ceramics, by William F. Zimmerman, W.J. Plankenhorn and Dwight G. Bennett. Illinois. University. Dept. of Ceramic Engineering, Urbana, Ill. Mar 1952. 31p diagr, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133013

Ceramic tile pieces approximately 1 in. thick and either 1/4 in., 1/2 in., or 1 in. square were prepared from a high alumina porcelain, a zircon porcelain and a cordierite body. These ceramic specimens were fired in contact with the porcelain enameled surface of low carbon sheet steel approximately .052 in. thick. An enamel of low softening point (900°F.) and two series of graded expansion laminated coatings were used as the bonding medium in an effort to reduce shear stresses caused by the differential contraction of metal and ceramic. Smaller tile size, greater body porosity and retarded cooling rate seemed to aid in the development of a bond. Although it was possible to firmly attach the alumina, zircon and cordierite bodies to metal under favorable conditions, and extremely high stress level was generally indicated. ATI 158621. Project 1035. Contract W-33(038)-ac-14520. AF WADC TR 52-86.

ORDNANCE AND ACCESSORIES

Action of an explosive on surrounding nonreacting metal dust, by Joseph Hershkowitz. U.S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N.J. Dec 1957. 51p photos, diagr, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 133492

The behavior of a system consisting of a small quantity of explosive located in the center of a field of nonreacting metal dust has been studied experimentally and theoretically. Ordnance project TA 2-9201C. DA project 5A04-01-027. PA TR 2484

Case, cartridge, carbine, steel, caliber .30 manufactured by the interim process (3-draw) pending development of a two-draw method, by Sidney White and Peter P. Bertino. U.S. Frankford Arsenal, Philadelphia, Pa. Mar 1957. 49p tables. Order from LC. Mi $3.30, ph $7.80. PB 133452

1. Cartridges - Cases - Steel 2. Cartridges - Cases - Manufacture 3. FALR 73

Magnetic particle investigation of 5"/38 projectiles (HC), cold formed, procured under NORD 15896, by B.R. Carter. U.S. Naval Gun Factory, Washington, D.C. Jun 1957. 20p photos, table. Order from LC. Mi $2.40, ph $3.30. PB 133045

The object of the investigation was to determine whether the method specified in MIL-P-18950 (NORD) for magnetic particle inspection of 3" projectiles could be applied to the examination of 5"/38 projectiles manufactured by the cold forming process to disclose defects deeper than 0.001. NGF T-23-57. NAVORD 5514.

PERSONNEL APTITUDE TESTING

Evaluation of the Puerto Rican screening test (ECFA) against sucess in training, by Kenneth F. Schenkel, Herbert B. Leedy, Nathan Rosenber, and John P. Mundy. U.S. Adjutant General's Office. Personnel Research Branch, Washington, D.C. Jan 1957. 19p graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 133010

The studies described in this report were undertaken to evaluate the capacity of the ECFA and NLT to identify successful and unsuccessful trainees under conditions of the 20-week and of the 24-week training programs. The ECFA is a highly effective test for predicting level of English fluency and level of soldier performance of IPR's in basic training under conditions of either program. The NLT serves well in identifying IPR's who would be retained or separated for inaptitude. DA project 29560000, Task 290. PRB project A-5-129-14, D-15-290-21. WD AGO PRB TRR 1097.

Mechanical ability: Comparisons of test scores for Naval enlisted men and women, by Roger B. Allison, Jr. Educational Testing Service, Inc., Princeton, N.J. May 1956. 16p tables. Order from LC. Mi $2.40, ph $3.30. PB 127003

This report describes one of a series of research studies concerned with the appropriateness of certain selection and classification procedures for use with enlisted WAVE personnel. It was undertaken to provide general information relating to sex differences on scores from the Navy Basic Test Battery, and, in particular, to explore possible sex differences in certain aptitude measures of mechanical motor skills. Contract Nonr-694(00). NAVPERS TB 56-5.

Personnel research for officer candidate school, by J.A. Parrish and A.J. Drucker. U.S. Adjutant General's Office. Personnel Research Branch. Nov 1957. 24p graph. Order from LC. Mi $2.70, ph $4.80. PB 133389

The Personnel Research Branch of The Adjutant

General's Office has included in its mission a continuing research effort to provide for the Army means of identifying enlisted personnel who through training in OCS could become effective reserve officers. The purpose of this study was to report accounts of research conducted by the Army's research scientists in the accomplishment of that mission. Much experimental effort has been devoted to research leading to the development of measures to predict leadership performance in OCS and to research to predict later success of OCS graduates as reserve officers. Factors influencing the effectiveness of this battery are discussed. DA project 29560000 WD AGO PRB TRR-1107.

Validation of a proposed officer effectiveness selection battery, by Ernest C. Types, A. Carp, and Walter R. Borg. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Laboratory, Lackland Air Force Base, Tex. Dec 1957. 25p diagrs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133478

In a recent report (AFPTRC-TN-57-87, PB 129671) a proposed officer effectiveness selection battery was outlined. In the present study, these various suggested procedures were administered to members of two Air Force Officer Candidate School classes at the start of their training, and subsequently validated against performance in training as well as well as against an intermediate criterion of officer effectiveness. AD 146415. Project no. 7719, Task no. 17009. AF PTRC TN 57-141.

PHOTOGRAPHIC AND OPTICAL GOODS

Bibliography and abstracts of analytical photogrammetry. See entry under Bibliography on page 205. PB 133451

Bibliography on photographic film dosimetry. See entry under Bibliography on page 205. PB 151026

Brillouin zone theory and photographic latent-image studies, by George B. Spence, Robert L. Martin, J.H. Enns, and Ernst Katz. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Mar 1957. 35p photos, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 126938

An instrument is described which has been built for the automatic recording of sequence exposures on 4-by-10-in. photographic plates. A theoretical discussion of isodense loops is presented which is based on the hypothesis that for isodense exposures the probability of rendering the last grains developable must be equal. It is shown how this method should yield the limiting slope of the low-intensity failure curve, and the minimum number of quanta absorbed by the average grain to become developable. Project no. R 355-40-10. For Parts I and II see PB 125856 and 125898. Abstracts and Tables of Contents of Parts I and II are included in final report. Part III is Photographic sequence exposure experiment, by J.H. Enns and E. Katz. (Submitted for publication in the Journal of the Optical Society of America.) Contract AF 18(600)-750, Final report. MU ERI Proj 2158-F. AF OSR TR 57-22.

Discussion of the photoelastic isochromatic negative, by J.H. Flanagan. U.S. Arsenal, Watertown, Mass. Jan 1954. 19p photos, table. Order from LC. Mi $2.40, ph $3.30. PB 127455

An expression is derived for the tone reproduction of the photoelastic stress image by the photographic negative emulsion. The graph of the tone reproduction equation is utilized to illustrate the influence of emulsion, exposure and photoelastic conditions on the photoelastic isochromatic negative. O.O. project TR 3-3027. D/A project 501-01-006. WAL R 893/163.

Evaluation of optical filters for special military purposes. 1: Dark adaptation and the near ultraviolet, 2: Evaluation of an experimental air-sea rescue goggle, by George Moeller. Connecticut College, Dept. of Psychology, New London, Conn. Feb 1956. 33p photos, map, diagr, graphs, table. Order from LC. Mi $3.00, ph $6.30. PB 126872

The two studies reported first were concerned with the effects of exposure to the near ultraviolet upon subsequent dark adaptation. Those studies failed to confirm reports by others that exposure to the near ultraviolet affects dark adaptation deleteriously. The third experiment reported here was designed to evaluate an experimental air-sea rescue goggle. The evidence indicates that the goggles will not improve visual performance in detection of small target against a water background relative to such performance without any visual aid. Report no. 5. Contract Nonr-1276(00), NR 142-082, Final technical report. NMRI Project NM 002 014.09.05. NMRI R 268.

Interference fringes behind shock wave shadows, by Nathan Gerber and Joan M. Bartos. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen Proving Ground, Md. Apr 1956. 21p photo, diagrs. Order from LC. Mi $2.70, ph $4.80. PB 126978

The phenomenon of light fringes just behind the main shock wave on a shadowgraph of a supersonic missile is illustrated and discussed. Equations which can be used to calculate the width of the fringes are derived, based on geometrical optics together with some elementary notions of physical optics. Measurements of fringe widths by a photodensitome-

ter on two shadowgraphs agree reasonably well with calculations, considering the experimental problems involved and the approximate nature of the analysis. Dept. of the Army project no. 5B03-03-001. ORD Project no. TB 3-0108. APG BRL M 991.

Methods for applying celestial observations to metric photography, by Andrew C. Bendixen. U.S. Redstone Arsenal. Ordnance Missile Laboratories, Huntsville, Ala. Dec 1956. 47p diagrs. Order from LC. Mi $3.30, ph $7.80. PB 132440

Report no. 3M111p. 1. Stars - Photography 2. Cameras, Astronomical - Calibration 3. Cameras, Aerial 4. Photogrammetry

Power handling capability of the foamed plastic Luneberg lens, by Lionel J. Sirois. U.S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base Rome, N.Y. Dec 1957. 31p photos, diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133256

Generalized charts and a method of analyzing the effect of power attenuation are presented for predicting the maximum power which the lens can handle as a function of size and frequency. AD 131378. Project 45248C, Task 4506. AF RADC TN 57-395.

Sensitometric properties and characteristics of type 1B, class N high-speed panchromatic aerial film for rapid processing, by Jack C. Lewis. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aerial Reconnassance Laboratory, Wright-Patterson Air Force Base, Dayton, O. Sep 1957. 12p graphs. Order from LC. Mi $2.40, ph $3.30. PB 133210

This technical note describes an improved, extra high speed, panchromatic negative, aerial film which is now available and which is suitable for rapid processing at elevated temperatures. The film's high emulsion speed and extreme sensitivity to red make it particularly useful for aerial reconnaissance photography which must be accomplished under difficult conditions of illumination or at night when artificial illuminants must be used. The physical properties of the film are adaptable to either conventional processing at 68°F or to rapid processing at 90°F. Detailed sensitometric data and high-temperature processing data obtained from tests conducted at Wright Air Development Center are presented. AD 142059. Project 6272, Task 62171. AF WADC TN 57-359.

Simultaneous determination of the orientation and lens distortion of a photogrammetric camera, by Duane C. Brown. U.S. Air Force. Air Research and Development Command. Missile Test Center, Patrick Air Force Base, Fla. Nov 1956. 27p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 127059

The rigorous least squares calibration of the orientation of a photogrammetric camera is extended to determine additional parameters defining the radial distortion of the camera lens. AD 96626. RCA Data Reduction Technical report no. 33. AF MTC TR 56-20.

PHYSICS

General

Approximate yield conditions in dynamic plasticity, by P.G. Hodge, Jr. and Burton Paul. Polytechnic Institute of Brooklyn. Dept. of Aeronautical Engineering and Applied Mechanics, Brooklyn, N.Y. Jan 1957. 24p diagr, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132446

When an approximate yield condition is used to determine the static collapse load of a rigid-plastic structure, bounds on the error introduced are furnished by the theorems of limit analysis. However, for the case of dynamic loading no such general results are available. The present paper considers such an approximation for the particular problem of a simply supported circular cylindrical shell subjected to a uniform pressure pulse. It is found that the errors are somewhat greater than in the case of static loading, but that reasonable results are obtained if the two yield conditions are adjusted so as to predict the same static collapse load. Contract Nonr-839(17), NR 360-001. PIB AL 368.

Density measurements for small particles, by Nora E. Srp. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. May 1958. 10p photo, table. Order from OTS. 50 cents. PB 151003

A method is described for determining the density of small solid objects. These samples were measured at $80^{\circ} \pm 0.05^{\circ}$ Fahrenheit. Since standards were not obtained the accuracy was not determined. The expected deviation from the mean for a single determination is +0.7 g/cc. AD 151188. Project 7360, Task 73602. Covers work from 1 Nov 1956-1 Nov 1957. AF WADC TN 57-395.

Exact solution of laminar heat transfer in wedge-shaped passages with various boundary conditions, by J.T. Yen. Minnesota. University. Heat Transfer Laboratory, Minneapolis, Minn. Jul 1957. 47p diagr, graphs, tables. Order from OTS. $1.25. PB 131982

Exact solutions of heat transfer for fully-developed laminar flow in circular sector ducts with various boundary conditions are presented. The boundary conditions are presented. The boundary conditions are taken respectively as constant peripheral wall heat flux, constant peripheral wall temperature, and arbitrary peripheral wall heat flux or temperature. All cases have the same axial boundary condition of constant heat flux. AD 118190. Project 7-(1-3080). Contract AF 33(616)-3853. AF WADC TR 57-224.

Experimental investigation of flow with heat transfer between concentric rotating cylinders, by Leslie A. Hromas and Thomas R. Thompson. Purdue University. Purdue Research Foundation. School of Aeronautical Engineering, Lafayette, Ind. Oct 1956. 92p photos, drawings (1 fold), diagrs, graphs, tables. Order from LC. Mi $4.50, ph $15.30.
PB 133028

The interrelation between the velocity and temperature profiles for compressible laminar flow is of interest in many fluid dynamics problems. In order to gain a further insight into the character of such flows the simplified geometry of Couette flow was chosen for a theoretical investigation. The present report deals with the experimental portion of the investigation in which heated rotating concentric cylinders were used to generate the flow. A detailed account of the construction of the apparatus is given. The cylinders were oriented with their axes horizontal with the outside cylinder rotating while the inside was held stationary. Report A-56-3. Fellowship 997. Project Ae-24. Contract DA 33-008-ord-888.

Experimental study of initial and subsequent yield surfaces in plasticity, by P. M. Naghdi, F. Essenburg, and W. Koff. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Jan 1957. 15p photos, graphs. Order from LC. Mi $2.40, ph $3.30. PB 132560

Ordnance project TB 20001(234). DA project 599-01-004. 1. Plasticity - Theory 2. Aluminum alloys - Plastic deformation 3. Contract DA 20-018-ORD-12099 4. MU ERI TR 8 5. MU ERI Proj. 2027-8-T

Flow of an incompressible viscous fluid along a semi-infinite flat plate, by S. Goldstein. California. University. Institute of Engineering Research, Berkeley, Calif. Dec 1956. 18p. Order from LC. Mi $2.40, ph $3.30. PB 133442

HE 150-144. 1. Flow, Fluid - Mathematical analysis 2. Flow, Fluid - Viscosity 3. Contract Nonr-222(45) 4. UC IER Series 20, Issue 113

Heat-transfer characteristics of a hemisphere cylinder at hypersonic Mach numbers, by E. M. Winkler and J. E. Danberg. U.S. Naval Ordnance Laboratory, White Oak, Md. Apr 1957. 45p photos, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 132811

The heat-transfer characteristics of the laminar compressible boundary layer on a hemisphere cylinder have been investigated at free-stream Mach numbers of 5, 6.5, and 8. The Reynolds number based on free-stream conditions and model diameter was varied from 70,000 to 700,000. Various conditions of steady-state heat transfer to the model were realized by circulating a coolant through the model, and by varying the tunnel supply air temperature. Projects NOL 133-1-56 and NOL 291. NOL ARR 336. NAVORD 4259.

Heat transger coefficients for gases; Effect of temperature level and radiation, by H. J. Ramey, J. B. Henderson, and J. M. Smith. Purdue University, Lafayette, Ind. Dec 1953. 24p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133105

Convection heat transfer coeffiecients for cooling of steam and air flowing inside a 2" pipe were measured from 500°F. to 1200°F. at gas-to-wall temperature differentials of 300° to 1000°F., and over a range of Reynolds numbers from 2,000 to 20,000 for air and 5,000 to 60,000 for steam. Presented at the annual meeting of the American Institute of Chemical Engineers Heat Transfer Symposium, 13-16 Dec 1953. Reprint no. 10. Contract N6 ori-105, T.O. III, NR 098-038. PUR 24-P. Project Squid.

Precision method with automatic recording for the study of freezing points in multicomponent systems, by Robert H. Dettre and Donald H. Andrews. Johns Hopkins University, Baltimore, Md. Nov 1957. 59 diagrs, graphs, tables. Order from LC.
PB 133382

Thesis: Johns Hopkins University. Technical note 1. Chem 40-12. 1. Freezing point - Determination - Equipment 2. Liquids - Cooling 3. Contract AF 18 (600)-765 4. AF OSR TN 57-661.

Preliminary investigation of surface effects in flow and fracture, by T. L. Johnston and Earl R. Parker. California. University. Institute of Engineering Research. Minerals Research Laboratory, Berkeley, Calif. Jan 1957. 22p photo, diagrs, tables. Order from LC. Mi $2.70, ph $4.80. PB 132475

Initial experiments were confined to ionic solids in order to see if an effect analogous to stress-corrosion cracking could be brought about without some of the confusing complications, such as electrochemical reactions, associated with metals. Preliminary experiments were made on stress-corrosion embrittlement of silver and potassium chlorides. Most of the report is concerned with experiments performed with ice. Contract N7 onr-295(16), NR 031-255, 16th technical report. UC IER Series 27, Issue 1.

Study of chemical-physical nature of adhesion of ice to solid surfaces, by Philip E. Berghausen, Robert J. Good, and others. Cincinnati. University. Applied Science Laboratory, Cincinnati, O. Oct 1953. 63p diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80.
PB 133060

In the theoretical portion of the research, studies were made on: (1) Theoretical relation between energy of adhesion and force of adhesion, both in highly simplified terms and quantum mechanically. (2) Theoretical calculation of the energy of adhesion between carbon tetrachloride and graphite. (3) A method was developed for calculating the energy of adhesion of ice on different solids from gas adsorption isotherms. In the experimental part of the research, studies were made on: (1) The tensile strength of ice-to-metal joints as a function of ice-plug volume. (2) Heats of immersion in water for lead chromate, covered with varying amounts of perfluorodecanioc acid and of stearic acid. (3) The relative heat of adhesion for ice on barium sulfate. AD 85735. Project 1111, Task 70805. For later report see PB 121047. Contract AF 33(616)-231. AF WADC TR 53-461.

Summary of conference on bubble dynamics and boiling heat transfer held at the Jet Propulsion Laboratory, 14 and 15 Jun 1956, edited by S. G. Bankoff, W. J. Colahan, Jr., and D. R. Bartz. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Dec 1956. 51p graph. Order from LC. Mi $3.60, ph $9.30.
PB 133162

ORD CIT Project. Includes "Note on the correlation of data in nucleate, pool boiling from a horizontal surface", by N. Zuber. 1. Boiling - Heat transfer 2. Bubbles, Vapor - Dynamic properties 3. Contract DA 04-495-ORD-18 4. CIT JPL M 20-137

Survey of compressibility and dissociation effects on steady laminar boundary layer flow. Part I: Flow without pressure gradient, by Robert J. Goulard. Purdue University. Purdue Research Foundation. School of Aeronautical Engineering, Lafayette, Ind. Dec 1956. 142p diagrs, graphs. Order from LC. Mi $7.20, ph $22.80.
PB 133020

Report A-56-4. Fellowship 997. Project Ae-24. 1. Boundary layer, Laminar - Flow 2. Boundary layer, Laminar - Heat transference 3. Flow, Compressibility - Mach number effects 4. Contract DA 33-008-ord-888

Turbulent diffusion of momentum and heat from a smooth, plane boundary with zero pressure gradient. Final report under Contract no. AF 19 (604)-421. Part II: Presentation of data and analysis, by J. E. Cermak and A. C. Spengos. Colorado Agricultural and Mechanical College. Dept. of Civil Engineering, Fort Collins, Colo. Dec 1956. 114p diagr, graphs, tables. Order from LC. Mi $6.00, ph $18.30.
PB 127374

A systematic experimental study to determine the effects of a lapse upon characteristics of a turbulent boundary layer flow having a zero longitudinal pressure gradient. Lapse conditions were created by placing a 6- x 10-ft heated plate to form the floor of a wind tunnel test section 6- x 6-ft square and drawing air through the test section to create a turbulent boundary layer on the plate. CER No. 56 JEC 22. For Scientific report no. 1 see PB 122370. Contract AF 19(604)-421, Final report, Part II. AF CRC TN 56-273.

Nuclear

Basic mechanisms in radiobiology. Part 4: Cellular aspects, by Harvey M. Patt and E. L. Powers. National Research Council, Washington, D.C. 1956. 199p photos, diagrs, graphs, tables. Order as Publication 450 from NAS-NRC Publications Office, 2101 Constitution Ave., N.W., Washington 25, D.C. $1.50.
PB 127430

Proceedings of an informal conference, Bear Mountain, New York, 12-14 May 1955. For Parts 2 and 3 see PB 114991 and 117347. 1. Cells - Effects of radiation 2. Radiobiology 3. NRC NSS 18 4. NRC 450

Effect of neutron irradiation on the Curie temperature of a variety of ferrites, by E. I. Salkovitz, C. C. Bailey, and A. I. Schindler. U.S. Naval Research Laboratory. Jul 1958. 6p photos, graphs, tables. Order from OTS. 50 cents.
PB 131838

A variety of commercially available ferrites were irradiated in the Brookhaven reactor for a total integrated flux of 1.2×10^{17} nvt (fast), at a temperature of 50°C. None of the samples showed a significant change in the Curie temperature. NRL R 5161.

Electron scattering from neighboring nuclei, by Beat Hahn, Robert Hofstadter, and D. G. Ravenhall. Stanford University. W. W. Hansen Laboratories of Physics. High-Energy Physics Laboratory, Stanford, Calif. Nov 1956. 11p graphs. Order from LC. Mi $2.40, ph $3.30.
PB 132917

A new method of measuring small variations of the charge distributions of neighboring nuclei, such as isotopes and isotones, has been developed. The method is based on a determination of the ratio of electron scattering cross sections near the diffraction dips. Experimental results are given for the combinations Ni^{58}, Ni^{60} and Fe^{56}, Ni^{58}, Sample theoretical interpretations are presented. AD 110355. Project R 357-20-9. Contract AF 18(600)-646. SU HEPL-113. AF OSR TN 56-536.

Energy exchange processes through Coulomb collisions in gaseous discharge plasmas studied by microwave interaction techniques, by Arwin A. Dougal and L. Goldstein. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Gaseous Electronics Section, Urbana, Ill. Jun 1957. 182p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $8.40, ph $28.80. PB 132100

A theory of energy flow from the selectively heated electron gas of a bounded plasma to the ion and molecule gases, and to the boundary, is formulated. A theory of energy exchange between electron and ion gases is developed for a limiting model of the plasma, and compared to previously existing theories. Experiments were performed in plasmas which were produced in different parent gases, primarily neon and helium. The method of guided microwave interaction was employed for selectively heating the electron gas to increments above that of the ion and gas temperatures, and for sensing the plasma during the subsequent transient when the electron temperature relaxes to that of the ions and atoms. In addition, phototube detection of the plasma luminous intensity is employed to detect electron temperature deviations. AD 117096. Project no.: 4156, Task no.: 46310. Contract AF 19 (604)-2152, Scientific report no. 1. AF CRC TN 57-388.

Final report under Contract N6 ori-02018, NR 021-052, for the period 1 Apr 1947-31 Dec 1954, by Marcel Schein. Chicago. University. Dept. of Physics, Chicago, Ill. Jan 1955. 16p. Order from LC. Mi $2.40, ph $3.30. PB 127008

The primary purpose of this report was to explore high energy phenomena occurring in the cosmic radiation. Supported jointly by the Office of Naval Research and the Atomic Energy Commission.

Heat transfer in a laminar boundary layer on a partially sweat-cooled plate, by Shao Wen Yuan and C. Chin. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Aug 1949. 20p diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 134550

A theoretical investigation is made of the flow of a hot fluid over a partially porous flat plate under the condition of uniform fluid injection from the bottom of the plate. An expression for the boundary layer thickness at the beginning of the porous portion is derived and used to determine the variation of boundary layer thickness in the direction of flow. Project Squid. Contract N6 ori-98, T.O. 2, NR 220-039. PIB TR 13.

Low frequency absorption project. Final report under Contract AF 18(600)-968, by Yardley Beers. New York University. College of Engineering. Physics Dept., New York, N.Y. Nov 1957. 5p. Order from LC. Mi $1.80, ph $1.80. PB 132987

This report contains summary of work at New York University on molecular absorption spectra in the region below 6000 Mc/sec. AD 136724. NYU report no. 289.9. AF OSR TR 57-90.

Molecular affinity, by James E. LuValle. Technical Operations, Inc., Arlington, Mass. Contract AF 18(600)-371. Order separate parts described below from LC, giving PB number of each part ordered.

I: Development of the concept. Jul 1957. 87p graphs, tables. Mi $4.80, ph $13.80. PB 132209

A concept of molecular affinity, α, a measure of chemical reactivity based on the molecular ionization potential, I, and the molecular electron affinity, A, has been developed $\alpha = I + A$. Hypotheses for the application of the concept have been postulated and a few examples treated. A table of atomic affinities for the entire periodic system has been computed from atomic electronegativities for use in computing molecular affinities. The theoretical basis for this concept is briefly discussed. AD 136538. Chem 20-3. TOI 57-18. Prepared for publication in the Journal of the American Chemical Society or the Journal of Chemical Physics. AF OSR TN 57-554.

II: Correlation with ionization potentials, electron, solvent, proton, nucleophile and radical affinities and resonance energy. Jul 1957. 109p graphs, tables. Mi $5.70, ph $16.80. PB 132210

AD 136539. Chem 20-3. TOI 57-19. Prepared for publication in the Hournal of the American Chemical Society or the Journal of Chemical Physics. 1. Atomic power - Research 2. Molecular interactions 3. Electron theory 4. AF OSR TN 57-555

III: Correlation with data obtained from the interaction of electromagnetic radiation with molecules. Jul 1957. 91p graphs, tables. Mi $5.40, ph $15.30. PB 132214

AD 136549. Chem 20-3. TOI 57-20. Prepared for publication in the Journal of the American chemical Society or the Journal of Chemical Physics. 1. Atomic power - Research 2. Molecular interations 3. AF OSR TN 57-566

IV: Correlation with chemical kinetic data. Jul 1957. 68p graphs, tables. Mi $3.90, ph $10.80. PB 132211

AD 136540. Chem 20-3. TOI 57-21. Prepared for publication in the Journal of the Ameri-

ican Chemical Society or the Journal of Chemical Physics. 1. Atomic power - Research 2. Molecular interations 3. AF OSR TN 57-556

V: Correlation with chemical equilibria data. Jul 1957. 87p graphs, tables. Mi $4.80, ph $13.80. PB 132212

AD 136541. Chem 20-3. TOI 57-22. Prepared for publication in the Journal of the American Chemical Society or the Journal of Chemical Physics. 1. Atomic power - Research 2. Molecular interactions 3. AF OSR TN 57-557

VI: Correlation with the orienting power of substituents and with the Hammett substituent sigmas. Jul 1957. 68p graphs, tables. Mi $3.90, ph $10.80. PB 132213

AD 136542. Chem 20-3. TOI 57-23. Prepared for publication in the Journal of the American Chemical Society or the Journal of Chemical Physics. 1. Atomic power - Research 2. Molecular interations 3. Chemical substitution 4. AF OSR TN 57-558

Molecular scattering by an exponential potential, by Edward A. Mason. Maryland. University. Institute of Molecular Physics, College Park, Md. Feb 1957. 13p graph. Order from LC. Mi $2.40, ph $3.30. PB 126966

A method is given for analyzing the results of small angle scattering measurements in terms of an intermolecular potential energy which can be represented as a decreasing exponential. A small angle approximation is used throughout, which permits the calculations to be performed analytically. As an example, the scattering of H_3 by He is considerable improvement over the previous interpretation in terms of an inverse power potential energy function. The same method can also be applied to other algebraic forms of potential energy functions. AD 115082. AF OSR Chem 40-31. IMP-OSR-2. Contract AF 18(600)-1562. AF OSR TN 57-44.

Naval Research Laboratory research reactor. Part V: Effects of air voids and fuel-free regions, by K.W. Marlow, E.I. Nowstrup, and R.H. Vogt. U.S. Naval Research Laboratory. Jun 1958. 19p diagrs, graphs, tables. Order from OTS. 75 cents. PB 131734

The reactivity effects of air voids in the reflector and in the core of the NRL Research Reactor were measured for a number of typical reactor configurations. In all cases, the interposition of cadmium between the reflector voids and the reactor prevented large reactivity increases when the voids were flooded with water. Reactivity changes were measured by subcritical multiplication, by addition of fuel, and with calibrated rods. There was a systematic difference in the magnitude of the numerical results, depending on the method used, with the results of the subcritical multiplication method being of relatively high magnitude and of the calibrated rods low. The effects of replacing fuel at the center of the core by water, graphite and beryllium oxide were also observed. For Parts 1-4 see PB 111859, 121050, 121879 and 131303. NRL R 5142.

Neutron magnetic scattering factors in the presence of extinction, by S. Chandrasekhar and R.J. Weiss. U.S. Arsenal. Watertown, Mass. Materials Research Laboratory. Jan 1958. 7p tables. Order from LC. Mi $1.80, ph $1.80. PB 133948

ORD project: TB 4-001. D/A project: DA 5-93-32-001. To be published as a Short Communication in Acta Crystallographica, 10 598(1957). 1. Neutrons - Scattering - Theory 2. WAL MRL 40

Nuclear physics. Final report for the period 1 Mar 1946-31 Mar 1956, under Contract N6 ori-071 (01). Illinois. University. Dept. of Physics, Urbana, Ill. Aug 1956. 36p. Order from LC. Mi $3.00, ph $6.30. PB 128078

The purpose of the contract was to support a broad program in basic research in nuclear physics. The scope was specifically stated as follows: 1. The study of the interaction of heavy nuclear particles with heavy nuclei and with each other. 2. The study of the interaction of light atomic particles with matter. 3. The study of the production of penetrating radiations and their characteristics and interactions with materials. In addition, the research shall involve the development of techniques and instrumentation for the above studies.

Nucleon - nucleon scattering at high energy, by M. Gourdin. Ecole Normale Supérieure, Laboratoire de Physique. Paris, France. n.d. 33p. Order from LC. Mi $3.00, ph $6.30. PB 133339

The nucleon-nucleon scattering and polarization experiments cannot be explained by a simple local potential. This method gives good results in the low energy domain. But between 0 and 300 MeV, for example, it is well known that the Schrödinger equation is inadequate. It is necessary, at high energies to use a completely covariant formulation for two body systems, the Bethe and Salpeter equation, in order to take into account relativistic corrections. Date is 1956 or later. Contract AF 61 (514)-1060, Technical note 7. AF OSR TN 57-683.

On the pion-electron decay, by M. Kawaguchi and K. Nishijima. Purdue University, Lafayette, Ind. Feb 1957. 4p. Order from LC. Mi $1.80, ph $1.80. PB 132295

1. Atomic power -Research 2. Mesotrons - Decay schemes 3. Decay series 4. Contract AF 18 (600)-1579 5. AF OSR TN 57-628

On the validity of Levinson's theorem for non local interactions, by A. Martin. Ecole Normale Supérieure. Laboratoire de Physique, Paris, France. n.d. 26p graphs. Order from LC. Mi $2.70, ph $4.80. PB 132972

By introduction of an artificial boundary condition on the one dimensional S wave function it is possible to compare the number of eigenstates of a non local Hamiltonian to the number of free eigenstates, provided the free and interacting eigenstates tend to coincide at high energies. Application of these results to the Low equation is discussed. AD 136661. Technical note no. 6. Date is 1957 or later. Contract AF 61(514)-1061. AF OSR TN 57-672.

Quarterly progress report under Contract N5 ori-07856. Massachusetts Institute of Technology. Solid State and Molecular Theory Group Cambridge Mass. Order separate parts described below from LC, giving PB number of each part ordered.

No. 21. Jul 1956. 56p graph, tables. Mi $3.60 ph $9.30. PB 127452

Contents: Magnetic hyperfine structure of lithium, by R.K. Nesbet. - Atomic wave functions, by R.E. Watson. - The lithium hydride molecule, by A. M. Karo and A.R. Olson. - Electronic energy of the OH molecule, by A.J. Freeman. - Ground state of the hydrogen molecule, by H.A. Aghajanian. - Polarization effects in thefluorine ion, by L.C. Allen. - Energy bands of graphite, by F.J. Corbato. - Lattice energy of potassium chloride, by L.P. Howland. - Calculations on atomic iron, by J. H. Wood. - An augmented plane wave method as applied to sodium and chromium, by M.M. Saffren. - Description of many-electron systems by two-particle orbitals, by J. Hawgood. - On the polaron energy and mass, by T.D. Schultz. - On the mobility of the polaron, by T.D. Schultz.

No. 22. Oct 1956. 62p. diagrs, graphs, tables. Mi $3.90 ph $10.80. PB 130024

Contents: Polarization effects in the fluorine ion and electronic wave functions for the hydrogen fluoride molecule. - The lithium hydride molecule. - He configuration interaction. - Atomic wave functions including r_{ij}. - Energy bands of two-dimensional graphite. - Electronic structure of KCl and KCl with V-center. - Electron-lattice interactions. - Magnetic hyperfine structure of lithium. - Spherical harmonic representations of the point groups. - Band structure of MnO. - Ionic starting functions for an MnO band calculation. - Calculations on atomic iron. - An augmented plane wave method for iron. - Ground state of the hydrogen molecule.

No. 23. Jan 1956. 62p diagrs, graphs tables. Mi $3.90, ph $10.80. PB 127341

Contents: Electronic wave functions for the hydrogen fluoride molecule, by L.C. Allen. - The lithium hydride molecule, by A.M. Karo and A.R. Olson. - Electronic structure of KCl, by L.P. Howland. - O= wave functions by R.E. Watson. - Valence states and molecular binding energies, by A.C. Hurley. - The electronic structure of BH, by A.C. Hurley. - An intra-atomic correlation correction of OH, by A.J. Freeman and A.C. Hurley. - Application of the I.B.M. 704 computer of solid state and molecular theory, by A.C. Switendick.

No. 24. Apr 1957. 35p graphs, tables. Mi $3.00, ph $6.30. PB 133592

Contents: Electronic wave functions for the hydrogen fluoride molecule, by L.C. Allen. - LCAO MO SCF wave functions for FH, by L.C. Allen and A. M. Karo. - The lithium hydride molecule, by A.C. Hurley. - Configuration interaction calculation on the gru ground state of the hydrogen molecule, by H.A. Aghajanian. - Multi-center integral programs for I.B.M. 704 Computer, by A.C. Switendick. - Atomic calculations, by R.W. Watson. - Lattice vibrations in alkali halide crystals, by A.M. Karo. - Augmented plane wave method for iron, by J.H. Wood. - Hyperfine structure in Mn^{++}, by J.H. Wood.

Radiative transition in protonium, by Thomas Fulton. Johns Hopkins University, Baltimore, Md. Feb 1957. 7p. Order from LC. Mi $1.80, ph $1.80. PB 126963

On the basis of preliminary estimates made from presently available data, the possibility of observing the radiative 2P - IS transition in the hydrogen-like bound state of a proton and antiproton is suggested. A significant correction to the energy of such a transition would be provided by the nuclear interaction. The measurement of the transition energy could therefore be used to obtain a value of the scattering length for proton-antiproton scattering. AD 120441. JHU HER-1. Contract AF 18 (603)-143. AF OSR TN 57-93.

Separation and identification of overlapping structure components: Application to mercury resonance radiation, by Paul L. Sagalyn, Adrian C. Melissinos and Francis Bitter. U.S. Arsenal. Watertown, Mass. Ordnance Materials Research Office. Materials Research Laboratory. Oct 1957. 23p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 132093

Project TB 4-001. DA Project 5-93-32-001. Based on a thesis submitted by Adrian C. Melissinos, Massachusetts Institute of Technology.

1. Atomic power - Research 2. Mercury - Isotopes - Magnetic resonance 3. WAL MRL 35

Simple model for barrier to internal rotation. II rotational isomers, by Maurice M. Kreevoy, and Edward A. Mason. Maryland. University. Institute of Molecular Physics, College Park, Md. and Minnesota. University. School of Chemistry, Minneapolis, Minn. Mar 1957. 16p diagr tables. Order from LC. Mi $2.40, ph $3.30. PB 132739

1. Atomic power - Research 2. Molecular rearrangement 3. Ethylene - Exchange reactions 4. Contract Nonr-595(02)

Tables for the internal rotation problem, by Dudley R. Herschbach. Harvard University. Dept. of Chemistry, Cambridge, Mass. Contract Nonr 1866(14). Order separate parts described below from LC, giving PB number of each part ordered.

Part I: Introduction. 1957 or later. 35p diagr, tables. Mi $3.00, ph $6.30. PB 134441

1. Molecules - Rotation 2. Tables, Mathematical

Part II. 1957 or later. 14p tables. Mi $2.40, ph $3.30. PB 134442

1. Molecules - Rotation 2. Tables, Mathematical

Part III. 1957 or later. 65p tables. Mi $3.90, ph $10.80. PB 134443

1. Molecules - Rotation 2. Tables, Mathematical

Tables of one- and two-phonon contributions to temperature diffuse scattering, by A. Paskin. U.S. Arsenal, Watertown, Mass. Materials Research Laboratory. Mar 1958. 31p tables. Order from LC. Mi $3.00, ph $6.30. PB 134316

TB 4-001. DA 5-93-32-001. Details of this calculation will appear in an article to be published in Acta Crystallographica. 1. Tables, Mathematical 2. Particles - Scattering - Theory 3. WAL MRL 38

Theoretical physics. Final report under Contract N7 onr-43903, NR 017-609, for the period 15 May 1949-14 May 1956, by Charles J. Mullin. University of Notre Dame, Notre Dame, Ind. Jun 1956. 8p. Order from LC. Mi $1.80, ph $1.80. PB 126920

An outline of property investigated or completed from 15 May 1949 to 14 May 1956. A: Electromagnetic reactions with nuclei. B: Statistical mechanics. Includes list of publications.

Theory of the isotope shift, by G. Breit. Yale University. Nuclear Physics Division, New Haven, Conn. Jan 1958. 39p diagrs. Order from LC. Mi $3.00, ph $6.30. PB 133450

AD 148069. 1. Isotopes - Separation 2. Isotopes - Nuclear properties 3. Isotopes - Energy measurement 4. Contract AF 18(600)-771 5. AF OSR TN 58-30

Transmission of fission neutrons having energy above the $S^{32}(n,p)P^{32}$ threshold by straight cylindrical ducts in water, by R.E. Benenson and A.N. Fasano. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, O. Feb 1957. 37p diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133190

AD 118088. Project 7112. 1. Neutrons - Transmission 2. Neutrons - Attenuation - Measurement 3. AF WADC TR 57-89

PHYSIOLOGY

Accommodative fatigue in the aging radar observer, by Jerome A. Hirsch. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Apr 1958. 15p photos, diagr. Order from OTS. 50 cents. PB 131991

Ocular fatigue in radar observers was studied to determine if an ophthalmic appliance for the observer or an optical magnifier for the scope presentation would aid in the alleviation of this problem. It was found that the accommodative mechanism per se, would not fatigue after a one-hour period of observation at the near point of the observer. Ocular fatigue in radar observers was therefore not considered to be an accommodative fatigue but was probably due to other factors. AD 142297. Project 7175, Task 71808. AF WADC TR 58-24.

Evaluation of respiratory disabilities. Final report for the period 15-31 Jul 1956, under Contract no. Nonr-923(04), by Harold A. Lyons. New York University. Research Division, New York N.Y. Aug 1956. 6p tables. Order from LC. Mi $1.80, ph $1.80. PB 127397

The studies include the measurement of ventilation. mechanics and the volume of the lung.

PSYCHOLOGY

Aeronautical charts under red lights, by Mason N. Crook, John A. Hanson, and Alexander Weisz. Tufts College. Institute for Applied Experimental Psychology, Medford, Mass. May 1954. 48p fold maps (part col). Order from LC. Mi $3.30, ph $7.80. PB 133361

The general problem of designing charts for legibility under red cockpit light is examined in the context of related problems. The characteristics of charts and the techniques for presenting information on them are analyzes and evaluated in relation to possible methods for improving red light legibility. Several lines of research carried out under this project are reviewed, and two experimental charts are exhibited and described. Methods for improving red light legibility, within the framework of present size and space limitations and production techniques, are summarized. AD 52509. Color will not reproduce. Color transparency in pocket. Contract AF 33(616)-2018. AF WADC TR 54-198.

Analysis of two-person game situations in terms of statistical learning theory, by Richard C. Atkinson and Patrick Suppes. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Apr 1957. 27p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133365

The study deals with an analysis of a zero-sum, two two-person game situation in terms of statistical learning theory and game theory. Three groups were run. Analysis of the data was in terms of two different but related stochastic models for learning and game theory. Specifically the following detailed comparisons of data and theory were made: (a) mean asymptotic response probabilities, (b) one a and two stage transition probabilities, and (c) variances associated with asymptotic response probabilities. Contract Nonr-225(17), NR 171-034. SU AMSL TR 8.

Analysis of a two-person interaction situation in terms of a Markov process, by Richard C. Atkinson and Patrick Suppes. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. May 1957. 25p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133364

The study deals with an analysis of a non-zero-sum, two-person game situation in terms of a Markov model for learning. The formulation of this model is derived from considerations similar to those employed by Estes and Burke in their stimulus sampling approach to learning. Two groups were run, each employing a different set of (x_i, y_i) values. The selection of these values was determined by game-theoretic considerations. Analysis of the results was in terms of the following comparisons between theory and data: (a) mean asymptotic response probabilities, (b) one and two stage transition probabilities, and (c) variances associated with asymptotic response probabilities. In general, the predicted and observed results were in close agreement. The results of the study were also considered from the viewpoint of game theory. Contract Nonr-225(17), NR 171-034. SU AMSL TR 9.

Comparison of training media: Transfer of principles involved in a manipulative skill; operation of the aircraft load adjuster slide rule, by Joseph A. Murnin. Pennsylvania State University. Instructional Film Research Program, University Park, Pa. Sep 1955. 38p photos, diagrs, tables. Order from LC. Mi $3.00, ph $6.30. PB 127034

The purpose of this study was to gather information in order to determine the teaching effectiveness of a training device designed to facilitate transfer of basic principles from one performance skill to a similar performance skill. The skills differed in the application of the basic principles to the new skill, i.e., the application of weight-and-balance principles from one aircraft type to another as these principles were applied in the operation of a slide rule system. Instructional film research program. SDC project 20-E-4. Contract N6 onr-269. SDC TR 269-7-103.

Configural scoring and prediction, by Edward F. Alf, Jr. Washington. University, Seattle, Wash. Nov 1956. 73p tables. Order from LC. Mi $4.50, ph $12.30. PB 126811

In this paper "configural scoring," "pattern analysis," and "pattern prediction" are used interchangeably as synonyms. All three phrases refer broadly to techniques for analyzing data which take into consideration the pattern of the client's response in making predictions. It is not the purpose of this paper to present an exhaustive historical account of the development of configural scoring methods. It studies in some detail one or two major contributions to configural scoring methodology in order to grasp more fully the techniques and significance of configural scoring approaches. This study was supported by Public Health Research Grant M-743(C2).

Detection theory and psychophysics, by Thomas Marill. Massachusetts Institute of Technology. Research Laboratory of Electronics, Cambridge, Mass. Oct 1956. 78p diagr, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 132062

In Part I, traditional psychophysical models and Tanner and Swets' model are critically examined.

In Part II, experiments using the forced-choice method with auditory signals masked by broadband gaussian noise are reported. The aim of these experiments is to determine the extent to which and the manner in which subjects differ from the "ideal detector" of detection theory. AD 110092. Based on a thesis, Massachusetts Institute of Technology. Contract AF 18(600)-1219. MIT RLE TR 319.

Effect of exposure time, individual variability, and practice on the precision of vernier adjustments, by H.W. Liebowitz and Noel Kaestner. Wisconsin. University, Madison, Wis. Mar 1954. 11p diagr, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133515

The effect of practice, individual variability, and duration of exposure on the precision with which a subject can align two straight edges was investigated. For untrained subjects, precision becomes poorer with decrease in either duration of exposure or luminance. Some subjects improved their performance with practice but the average acuity values for 32 subjects showed no significant changes. Individual differences with respect to practice and to the variables of luminance and exposure time were unusually large. AD 45693. Contract AF 18 (600)-54. AF WADC TR 54-77.

Effect of luminance and exposure time upon perception of motion, by H.W. Liebowitz and J.F. Lomont. Wisconsin. University, Madison, Wis. Mar 1954. 12p diagr, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133516

The isochronal threshold velocity is defined as the minimum rate of target displacement necessary for the detection of movement at a constant duration of exposure. Threshold values were obtained for a wide range of luminance values in foveal vision at various durations of exposure. AD 35163. One of a series of reports on perception of motion. Contract AF 18(600)-54. AF WADC TR 54-78.

Effect of the number of permissible response categories on the learning of a constant number of visual stimuli, by Harold W. Hake and Charles W. Eriksen. Johns Hopkins University. Institute of Coorperative Research, Baltimore, Md. Apr 1954. 31p graph, tables. Order from LC. Mi $3.00, ph $6.30. PB 133522

This study explored the possibility that the degree to which a set of stimuli are perceptually differentiated during labeling practice may be closely related to the ability of subjects to state explicitly which stimulus appears on each practice trial. The effects of severe restrictions upon the number of responses permitted subjects during labeling practice were measured in three transfer situations. AD 50284. Contract AF 33(038)-22642. AF WADC TR 54-163.

Effects of cold on psychophysical weight judgments: Methodological study, by Anthony Debons and Walter D. Chiles. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Sep 1957. 13p graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 133207

A methodological experiment was carried out to study the problems involved in obtaining psychophysical weight-judgment functions at lowered ambient temperatures. Weight judgements were obtained from two subjects by the method of constant stimulus differences with the temperature of weights at 70° and at -25° Fahrenheit. AD 131004. Project 7193, Task 71615. AF WADC TN 57-305.

Effects of concomitant colored pictorial representations on the learning of stimulus-words, by W.A. Bousfield, J. Esterson, and G.A. Whitmarsh. Connecticut. University, Storrs, Conn. Jun 1956. 6p tables. Order from LC. Mi $1.80, ph $1.80. PB 126894

The design of this study was such as to permit a comparative analysis of the learning of a stimulus-word list of 25 nouns presented under three different conditions, here designated as a, b, and c. These conditions were: a, words alone; b, words presented simultaneously with their uncolored pictorial representations; c, words presented simultaneously with their colored pictorial representations. Contract Nonr 631(00), Technical report no. 1.

Effects of Communist indoctrination attempts: Some comments based on an Air Force prisoner-of-war study, by Albert D. Biderman. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Office for Social Science Programs, Randolph Air Force Base, Tex. Sep 1957. 18p. Order from LC. Mi $2.40, ph $3.30. PB 133474

AD 134247. Project no. 7733, Task 77314.
1. Psychological warfare 2. Prisoners - Communist indoctrination 3. Communism - Indoctrination 4. AF PTRC TN 57-119

Evaluation of three types of information for supplementing knowledge of results in a training technique, by Glenn L. Bryan, Joseph W. Rigney, and Charles Van Horn. University of Southern California. Dept. of Psychology, Los Angeles, Calif. Apr 1957. 28p diagrs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133545

This study sought to determine the relative effectiveness of three different kinds of explanations when employed in the multiple-choice trainer format. Senior NROTC students from Stanford University served as experimental subjects. Each student participated in a none-hour training session which was

followed one week later with a criterion test. Primary experimental data, consisting of the differences between each man's score before and after training, was analyzed, and showed that significant learning occurred as a result of the one-hour training session with all of the three types of explanations employed. Technical report no. 19. Contract Nonr 228-093, NR 153-093.

Factors of task complexity and previous practices on a patterned component, by Alec J. Slivinske. Virginia. University, Charlottesville, Va. Dec 1953. 25p diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133510

This report covers a laboratory experiment attempting to relate independently the following variables to proficiency of performance in a complex task situation: (1) previous practice on a patterned component of the total task; (2) task complexity (defined as the number of discrimination-response units comprising the task); and (3) intercomponent stimulus similarity. AD 33354. Second of a series of reports on experimental analysis of complex task performance. AF WADC TR 53-313.

General least squares solution for successive intervals, by Gertrude W. Diederich, Samuel J. Messick, and Ledyard R. Tucker. Princeton University. Dept. of Psychology, and Educational Testing Service, Inc., Princeton, N.J. Nov 1955. 36p graph, tables. Order from LC. Mi $3.00, $6.30. PB 127180

A general least squares solution for successive intervals is presented, along with iterative procedures for obtaining stimulus scales values, discriminal dispersions, and category boundaries. Because provisions for weighting were incorporated into the derivation, the solution may be applied without loss of rigor to the typical experimental matrix of incomplete data, i.e., to a data matrix with missing entries, as well as to the rarely occurring matrix of complete data. The use of weights also permits adjustments for variations in the reliability of estimates obtained from the data. The computational steps involved in the solution are enumerated. A quick, yet accurate, graphical approximation suggested by the least square derivation is also described. Project on "Mathematical techniques in psychology." National Science Foundation Grant NSF G-642. Contract N6 onr-270-20, NR 150-088.

Human engineering investigations of the interior lighting of Naval aircraft, by Howard F. Gallup and William O. Hambacher. U.S. Naval Air Material Center. Air Crew Equipment Laboratory, Naval Air Experiment Station, Philadelphia, Pa. Order separate parts described below from LC, giving PB number of each part ordered.

Part 6: Investigation into the optimal characteristics of visual light indicator systems. Aug 1956. 20p diagrs, tables. Mi $2.40, ph $3.30. PB 132415

Nine subjects, engaged in the counting of randomly spaced dots of light appearing directly in front of them, were required to respond as quickly as possible to the stimulus lights, presented peripherally. These presentations were made randomly and the subjects' reaction time to the onset of the lights were recorded. The background of the stimuli was homogeneously dark. NAMC ACEL 298. NAM AML 52004, Part 6.

Part 7: Investigations into the optimal characteristics of visual warning and caution systems. Aug 1956. 22p diagr, tables. Mi $2.70, ph $4.80. PB 132416

Twelve subjects, engaged in a tracking task, were presented with stimuli consisting of a steady, a flashing, or an alternating light against a homogeneous background at an angle of 31° to 43° ($M = 37.6^{\circ}$) from the line of sight. An analysis of variance, performed on the data of this experiment, indicated that there were no significant differences among reaction times to the onset of three kinds of lights under either day or night conditions. The findings were in complete agreement with the predictions and with the results of a previous study. NAMC ACEL 299. NAM AML 52004, Part 7.

Part 8: Investigations into the optimal characteristics of visual warning and caution systems. Aug 1956. 23p diagr, tables. Mi $2.70, ph $4.80. PB 132417

The 10 subjects sat in a mock-up of the F7U Cutlass cockpit, illuminated under night conditions according to military specifications. Under day conditions the cockpit was flooded with two day-light lamps. The stimulus lights were thus presented against a heterogeneous background. The subject's task was to respond as quickly as possible to the stimulus lights, reaction time being the measure of the attention-getting value of the lights. NAMC ACEL 300. NAM AML 52004, Part 8.

Influence of stimulus similarity and stimulus rate, by L. Starling Reid and James G. Holland. Virginia. University, Charlottesville, Va. May 1954. 14p diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 133521

This study sought to determine the role of similarity among the stimuli controlling the task performance. In view of previous negative findings, symbols in the form of simple geometrical figures were used in order to provide greater opportunity for the manipulation of this variable. Also under investigation was the manner in which stimulus similarity was

related to two other variables, namely, rate of stimulus presentation and patterned versus random sequence of stimulus presentation. As in the two earlier experiments a visual discrimination motor task involving two components (i.e., a right-hand or basic component, and a left-hand or secondary component) was utilized. AD 49630. 3rd of a series of reports on experimental analysis of complex task performance. Contract W 33-038-ac-21269. AF WADC TR 54-146.

Informational evaluation of language translations, by Edwin B. Newman and George A. Miller. Harvard University. Psychological Laboratories, Cambridge, Mass. Jun 1957. 38p graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 132144

This report describes some psychological methods for evaluating the outputs of mechanical translating devices. Typically these methods provide a measure of the agreement between a machine-translation of some sample passage, on the one hand, and either the original passage or a high-quality "standard" translation of that passage, on the other. In two of the methods, human subjects are used to make this comparison. AD 110077. Contract AF 33(038)-14343. AF CRC TR 57-54.

Inter-battery method of factor analysis, by Ledyard R. Tucker. Princeton University, Dept. of Psychology, and Educational Testing Service, Inc., Princeton, N.J. Mar 1956. 48p tables. Order from LC. Mi $3.30, ph $7.80. PB 126879

The inter-battery method of factor analysis was devised to provide information relevant to the stability of factors over different selection of tests. Two batteries of tests postulated to depend on the same common factors, but not parallel tests, are given to one sample of individuals. Factors are determined from the correlations of the tests in one battery with the tests in the other battery. NSF G-642. Contract N6onr-270-20, NR 150-088.

Laboratory task for the study of individuals or groups, by Thornton B. Roby and John T. Lanzetta. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Operator Laboratory, Randolph Air Force Base, Tex. Oct 1957. 19p diagrs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133473

The laboratory task described in this report appears to be a versatile task which (at least theoretically) would permit the precise study of some hypothesized factors in group performance and would be adaptable to other problems in individual or small group behavior. The findings of this experiment indicate that administration of the task is easy and motivation of the subjects remains high. AD 134256. Project no. 7713, Task no. 27101. AF PTRC TN 57-124.

Mathematical techniques as related to psychological problems. Final summary report on Contract N6 onr-270-20 for the period 1 Sep 1951-30 Jun 1956, by Harold Gulliksen. Princeton University, Princeton, N.J. Jul 1956. 10p. Order from LC. Mi $1.80, ph $1.80. PB 127354

1. Psychology - Mathematical analysis

Methodology of preference measurement, by Lyle V. Jones. Chicago. University. Dept. of Psychology. Psychometric Laboratory, Chicago, Ill. Oct 1956 47p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133436

In establishing acceptability of foods, clothing, or equipment, either in the laboratory or under actual use conditions, it is necessary to obtain measurement of human preferences, attitudes, and opinions. General methods are available for this purpose, the various types of rating scales being most commonly used. It is recognized that factors other than those associated with preference can affect responses to the rating scales. An exploration of the importance of such factors yielded information valuable for improvement in the design and analysis of studies of preferences. Project 7-84-15-007. P-1101, Report 6. Covers period 1 Nov 1954-30 Sep 1956 under Contract DA19-129-qm-272.

Methods of research in technical training. Report of a conference held at the Naval Air Station, Memphis, Tenn. 11 and 12 Oct 1956, edited by Philip H. DuBois and Winton H. Manning. Washington University. Dept. of Psychology, St. Louis, Mo. May 1957. 121p graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 133214

Contents: Antecedents of part correlation in training research, by Winton H. Manning.—Potentialities of part correlation in training research, by Philip H. DuBois.-Analysis of covariance in the study of training, by David Bakan.-Insights on training from laboratory learning studies, by Marion E. Bunch.—Some unanswered questions in training research, by William McGehee.—Objectives for research in technical training, by Wilse B. Webb.—Appendix A: Annotated bibliography of gains studies, by Winton H. Manning.—Appendix B: Correlational analysis in training research, by Philip H. DuBois. Contract Nonr 816(02), Technical report no. 3.

Naval leadership. Annual technical report for the period 15 Feb 1952-15 Feb 1953, under Contract N6 ori-17 T.O. III, NR 171-123, by Carroll L. Shartle and Ralph M. Stogdill. Ohio State University Research Foundation, Columbus, O. Feb 1953. 12p. Order from LC. Mi $2.40, ph $3.30. PB 13096

1. Leadership—Research. 2. OSURF Proj 268 Report 18. AD 2534. For later annual report see PB 119829.

Scale design for reading at low brightness, by William J. White and Shirley C. Sauer. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton O. Mar 1954. 21p photos, diagrs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133170

This study concerns the manner in which speed and accuracy of quantitative scale reading varies as a function of graduation mark width and interval size under three intensities of red illumination such as are encountered in a cockpit at night. The data of the experiment consist of time and error scores obtained by different subjects, each under the same varying conditions. Graduation mark width varied from 0.008 inch to 0.063 inch and graduation intervals varied from 0.05 inch to 0.25 inch. AD 35201. AF WADC TR 53-464.

Some effects of interacting vestibular stimuli, by F. E. Guedry. U. S. Army Medical Research Laboratory. Psychology Dept., Fort Knox, Ky. Mar 1957. 17p diagr, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132780

This is a study of the subjective vestibular reaction to a positive angular acceleration followed by negative angular acceleration without an intervening period of constant angular velocity. One phase of the subjective experience, which theoretically is indicative of the response of the vestibular system while it is being driven, showed systematic change with variation in the independent variable. A second phase of the subject experience, which theoretically is indicative of the recovery of the vestibular system after the stimulus is removed, was more variable, and is much less predictable than the first. It is suggested that the vestibular response is consistant and predictable where stimuli approximate conditions of motion encountered under normal living conditions. AMRL R261.

Spacing of on-off controls. I: Push buttons, by James V. Bradley and Ronald A. Wallis. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. and Antioch College, Yellow Springs, O. Apr 1958. 21p photos, diagr, graphs, tables. Order from OTS. 75 cents. PB 131921

Thirty-six right handed male college students performed a standardized control operation in which the center one of three closely spaced push buttons was reached to and operated while avoiding contact with the adjacent controls. Manipulated variables were: diameter of all three controls, orientation of the linear array of controls, and spacing between edges of the controls. Reach-and-operation time, inadvertent touching of adjacent controls, and inadvertent operation of adjacent controls were recorded. AD 142272. Project 7182, Task 71514. Contract AF WADC TR 58-2.

Spatial stimulus-response correspondence: Performance on a key-pressing task as a function of the degree of spatial stimulus-response correspondence, by Robert E. Morin and David A. Grant. Wisconsin. University, Madison, Wis. Oct 1953. 27p photo, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133228

This study was to determine how performance is influenced by changes in the degree of spatial correspondence between the stimulus elements and the response elements of a motor task. This is both a question of the design of visual displays and the placement of controls. It arises whenever a task requires a subject to attend to more than one stimulus and to operate more than one control. AD 23332. Contract AF 18(600)-54. AF WADC TR53-292.

Studies on rate of apparent change as a function of observation time, using a new type of dynamic ambiguous figure, by Kenneth T. Brown. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. May 1954. 29p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133520

An improved dynamic ambiguous figure has been developed for experimental work. This figure is a perceptually two-dimensional wheel, which gives apparent changes in the direction of rotation. The basic measure in these studies was a curve showing the rate of apparent change (RAC) as a function of observation time. In the first experiment it was demonstrated that the physiological process which is responsible for the apparent changes is located at least as far back in the visual system as the primary visual cortex. In the second experiment it was shown that quantitative aspects of the RAC curve are strongly dependent upon the rate of stimulation per unit area which is delivered to the retina by the ambiguous figure. The third experiment provided an initial test of the above hypothesis. These experiments indicate that the RAC curve has a high potential for the Air Force as a method for measuring effects on neural sensitivity produced by such factors as visual work, hypoxia, and drugs. AD 50077. AF WADC TR54-139.

Study of conditions affecting cooperation, by Morton Deutsch. New York University. Research Center for Human Relations, New York, N.Y. Mar 1956. 26p col graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 126915

The research included in this Annual Report is part of a program of research on the conditions affecting cooperation. Early in this program of research, it became clear that a general theory of choice was applicable to the individual decision to cooperate or not, to join a group or not, to remain a member of an on-going group or not. Color will not reproduce.

For reports nos. 2 and 3 see PB 11646 and 119924; also PB 119157. Contract Nonr 285(10), Annual technical report no. 4.

Transfer of training after five days of practice with one task or with varied tasks, by Carl P. Duncan and Benton J. Underwood. Northwestern University, Evanston, Ill. Dec 1954. 21p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133525

Transfer among perceptual-motor paired-associate tasks were studied as a function of constant and varied training conditions. Following training, all groups were tested for transfer to four additional tasks. The results of this and the earlier reports again imply that if training task variations are introduced into training devices, the number of such variations should be such as to permit attainment of a high level of mastery on each within the available training time. Otherwise, there may be no advantage in varied training. AD 62687. Project 7197, Task 71638. Contract AF 33(616)-308. AF WADC TR54-533.

Transfer of training after 10 days of practice with one task or with varied tasks, by Carl P. Duncan and Benton J. Underwood. Northwestern University, Evanston, Ill. May 1954. 29p photo, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133519

Transfer among perceptual-motor paired-associate tasks was studied as a function of constant and varied training conditions. Transfer was tested over four days. Two of the four transfer tasks were used on each transfer day, so that half the subjects in each group were tested with one task, half with the other task, on each day. On the whole, varied training yielded superior transfer to constant training. AD 43067. Contract AF 33(616)-308. AF WADC TR54-115.

Visual contrast discrimination as a function of pre-exposure to light, by F. A. Mote, W. R. Biersdorf, G. W. Kent, and Jerome Myers. Wisconsin. University, Madison, Wis. Feb 1954. 16p diagr, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 133517

The just discriminable brightness contrast threshold was measured for 12 subjects (six using the natural pupils, six with 2 mm artificial pupils) at three values of target luminance following pre-exposure to a constant intensity for three durations. Each subject went through all nine combination of conditions five times. AD 33356. Contract AF 18(600)-54 AF WADC TR54-80.

RUBBER AND RUBBER PRODUCTS

Arctic tire development. Final report under Contract DA 33-019-ORD-1757, by H. S. Holloway. Firestone Tire and Rubber Company, Akron, O. Oct 1956. 17p tables. Order from LC. Mi $2.40, ph $3.30. PB 132893

1. Tires, Pneumatic—Research. 2. Tires, Pneumatic—Tests. 3. Contract DA 33-019-ORD-1757, Final report.

Gamma radiation of elastomers and their monomers, by Z. T. Ossefort. U. S. Arsenal, Rock Island, Ill. Apr 1957. 16p photos, diagr, graph, tables. Order from LC. Mi $2.70, ph $4.80. PB 132007

Specific examples and data typifying the work being performed in the following four areas of elastomer research are presented: Effects of radiation on vulcanized elastomers; The properties of elastomers which have been cured by exposure to varying dosages of gamma radiation; Evaluation of potential antirads in nitrile rubber; Gamma radiation initiated polymerization and grafting. Paper to be presented at an Army Conference on Elastomers to be held 24-25 Apr 1957 at the Engineer Research and Development Laboratories, Ft. Belvoir, Va. RIAL R57-1002.

Investigation of silicate esters as rubber plasticizers, by Donald L. Byerley. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Aug 1952. 16p graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 133043

A number of silicate esters were evaluated as low-temperature rubber plasticizers. An attempt was also made to correlate structural variations of the esters with the properties imparted to the compounded rubber. AD 173031. AF WADC TR52-180.

Manufacture of mold for production of rubber gloves and limited factory runs from molds. Comprehensive final report for Contract DA 18-108-CMI-5294, by Harry Gordon and Albert Trapani. Bond Rubber Corporation, Derby, Conn. Jun 1955. 19p diagrs, tables. Order from LC. Mi $2.40, ph $3.30. PB 127107

Five molds have been built, and used to produce consecutively gloves which are within commercial tolerances. These gloves have been run under factory conditions with varying results quality-wise.

Quality depends upon the efficiency of the operator—as well as certain conditions of temperature and pressure. Bringing all these under better control would result in a much higher quality level than was attained in this contract. It is felt that the methods used in producing these molds can be applied to other butyl items (protective butyl shoe covers or butyl hoods). AD 71854.

Physical properties of several synthetic rubbers after one year exposure to explosives, by Ronald R. Freeman. U. S. Arsenal, Rock Island, Ill. Jan 1958. 14p tables. Order from LC. Mi $2.40, ph $3.30. PB 133954

Unclassified report. Physical properties were determined on chlorosulfonated polyethylene, silicone, brominated butyl, polyurethane and polyacrylate vulcanizates which had been stored at 160 to 170 F for periods up to one year in contact with TNT, Tetryl and Composition B explosives. Brominated butyl and silicone vulcanizates were the least affected by one year exposure to explosives. The chlorosulfonated polyethylene rubber was deteriorated more by the long term storage conditions at 160 to 170 F than by contact with the explosives. After six months exposure to the nitro compounds, the vulcanizates based on polyurethane and polyacrylate polymers were severely degraded. DA project 5 B93-32-002. Ord project TB 4-002D. (Project NR. TB4-002D, DA Proj. Nr. 5B93-32-002). RIAL R58-83.

Preparation of rubber specimens for finished rubber items, by Fred W. Smith. U. S. Arsenal, Detroit. Laboratories Division. Materials Laboratory, Center Line, Mich. Feb 1957. 59p photos. Order from LC. Mi $3.60, ph $9.30. PB 133048

Manual incorporates techniques used in the preparation of rubber specimens for testing in order to obtain test results from finished items that will be as reliable as those from molded specimens. PESD 60304231-11-01101. DA R3812.

Propagation of stress waves in rubber rods, by W. S. Cramer. U. S. Naval Ordnance Laboratory, White Oak, Md. Sep 1956. 38p diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 132288

The propagation of longitudinal stress waves in rubber rods has been studied by producing a steady state excitation at one end of the rod and measuring the amplitude and relative phase along the rod with a moving probe. The frequency is made sufficiently high so that there is enough attenuation in the rod to eliminate standing waves. In the present study this technique was extended (by modifications of the driver and pickup) to include torsional and flexural waves. Velocity and attenuation data for the longitudinal, torsional, and flexural waves over the frequency range 1 to 8 kc at or near room temperature are presented for nine different rubber rods. NAVORD 4216.

STRUCTURAL ENGINEERING

Approximate analysis of Timoshenko beams under dynamic loads, by Bruno A. Boley and Chi-Chang Chao. Columbia University. Dept. of Civil Engineering and Engineering Mechanics, Institute of Flight Structures, New York, N. Y. May 1956. 23p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 127005

An approximate method for the analysis of Timoshenko beams under impact is presented; it is based on a "traveling wave" approach and on the principle of virtual work. Displacement functions are assumed in terms of several time-dependent parameters, the latter are found as the solution of a set of ordinary differential equations. Some of the characteristics of the propagation of disturbances are analyzed in the Appendix. Illustrative numerical results pertaining to semi-infinite and finite beams are also presented. Contract Nonr-266(20), Technical report no. 6.

Development of Arctic theodolite shelter, by J. Carl Garrison, Jr. U. S. Army. Corps of Engineers. Engineer Research and Development Laboratories, Fort Belvoir, Va. Oct 1956. 24p photos, tables. Order from LC. Mi $2.70, ph $4.80. PB 133261

The object of this project was to develop a small, lightweight prefabricated shelter to protect men and equipment from undue exposure while making theodolite observations in Arctic climates. The final and most successful development-type, theodolite shelter was of aluminum sheet and angle, and steel angle construction. This shelter is the principal shelter covered by this report since it was the final recommended type. Project 8-71-04-107. ERDL R1464-TR.

Frictional damping and resonant vibration characteristics of an axial slip lap joint, by James H. Klumpp and Benjamin J. Lazan. Minnesota. University, Minneapolis, Minn. Mar 1954. 41p photos, diagrs, graphs, table. Order from LC. Mi $3.30, ph $7.80. PB 132285

A brief summary of the various methods of damping analysis is presented. Data are procured on the frictional properties of mild steel in reciprocating sliding motion. The variation of the kinetic coefficient of friction as a function of normal load, lubrication, and number of cycles of motion is

studied. The friction testing apparatus is considered as a vibrating system with Coulomb damping and its frequency response and damping energy are analyzed. AD 31155. AF WADC TR54-64.

Investigation of a method for prestressing flat plates to increase their buckling strength, by C. T. Wang, A. L. Ross, and E. L. Reiss. New York University. College of Engineering, New York, N.Y. Feb 1954. 201p photos, diagrs, graphs, tables. Order from LC. Mi $9.30, ph $31.80. PB 133202

Flat plates can have their buckling strength increased by prestressing. Accomplished by first cold rolling the plates into cylindrical form and then opening the plate by riveting onto or clamping into a flat frame. Analysis shows that small stresses (1000 psi maximum) could raise the buckling load almost 50%. These stresses would also change the buckling mode in some of the cases examined from antisymmetrical to symmetrical modes. AD 35164. Contract AF 33(616)-49. AF WADC TR 54-8.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Cargo density and airlift, by Robert E. Bickner. Rand Corporation, Santa Monica, Calif. Jan 1957. 68p graphs, tables (1 fold). Order from LC. Mi $3.90, ph $10.80. PB 133532

This research memorandum presents the results of RAND studies of variations in the density of air cargo, and the effects of these variations on aircraft design, aircraft capacity estimates, airlift operations, and airlift costs. The purpose of the present study is to draw attention to the implications of the fact that air cargo varies in density and rarely, if ever, adheres to the average values which are usually computed. AD 112417. RAND RM 1853.

Method for evaluating aircraft stability parameters from flight test data, by Lloyd E. Schumacher. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Flight Test Division, Wright-Patterson Air Force Base, Dayton, O. Jun 1952. 53p photo, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 133018

A least-squares method for evaluating aircraft stability derivatives and transfer function constants from flight test frequency response data is derived. The normalized least-squares equations for rotating vectors are derived by minimizing the sum of the squares of the residual vectors without regard to the phase angles of these residuals. ATI 159339. Project R 274-9. AF WADC TR 52-71.

Instruments

Acoustical evaluation of general sound control model N-400 jet aircraft noise suppressor, by Robert M. Hoover and others. Bolt Beranek and Newman Inc., Cambridge, Mass. Apr 1958. 71p diagrs, graphs, tables. Order from OTS. $2.00. PB 151029

The General Sound Control Model N-400 jet aircraft suppressor which is used in conjunction with an F-100 A aircraft has been evaluated acoustically. This noise suppressor combines diffusion and absorptive suppressor components. The evaluation shows that the noise reduction of the suppressor varies from 0 to 50 db depending upon frequency and angular location about the suppressor-aircraft combination. It is also found that, in the highest octave bands, the use of the intake unit increases the noise reduction over that achieved by the exhaust unit alone up to 20 db directly in front of the aircraft. AD-142 162. Project 7210, Task 71708. Contract AF 33(616)-3938. AF WADC TN 57-391.

Analytical approach to the alleviation of dynamic tensions in aircraft arresting gear cables, by Glen L. Neidhardt, Norman F. Eslinger, and Frank Sasaki. American Machine and Foundry Company. Mechanics Research Dept., Chicago, Ill. May 1958. 123p diagrs, graph. Order from OTS. $2.75. PB 131995

In present designs of aircraft-arresting gear, the peak stress in the cable develops just after the first transverse wave (practically a kink) reaches the deck sheave and interacts with existing cable stresses. The primary purpose of this project is to develop means to alleviate this peak stress so that aircraft with higher landing speeds can be accommodated. This report covers the first phase of the project, which is to develop and appraise practical tension-alleviating devices on a theoretical basis. To this end, the problem of determining the interaction of traveling kinks, longitudinal waves, and fixed or moving sheaves in various combinations is formulated mathematically and then

reduced to graphical methods of solution. AD 155542. Project 1351. Contract AF 33(616)-5282. AF WADC TR 58-217.

Angle-of-attack and angle-of-yaw indicator using a direct-reading, simple strain-gage circuit on sting balances, by Robert B. Ormsby, Jr. U. S. David W. Taylor Model Basin, Washington, D. C. Feb 1954. 21p diagrs, graphs (part fold). Order from LC. Mi $2.70, ph $4.80. PB 134263

This report presents a method whereby the change in angle of attack (or yaw) due to change of applied forces and/or moments of a sting balance may be read directly on any standard strain indicator. The accuracy of this system is limited only by the inherent accuracy of strain-gage circuits and of calibration techniques. The time required for design, gage application, and calibration is about twice that for any one component on a multicomponent balance. DWTMB 885. DWTMB AERO R 855.

Anti-collision light installation for a bomber type aircraft, by Ronald M. Lehrer. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Directorate of Flight and All-Weather Testing, Wright-Patterson Air Force Base, Dayton, O. Dec 1956. 15p photos, table. Order from LC. Mi $2.40, ph $3.30. PB 127942

Two Grimes anti-collision lights installed on an RB-52B were evaluated to determine a suitable location and type of anti-collision light for a bomber type aircraft. AD 110575. Project 912A-101L. AF WADC TN 56-494.

Design and performance studies for improved multiple-shielded total temperature probes, by Frank D. Werner, Robert E. Keppel, and M. A. Bernards. Minnesota. University. Institute of Technology. Dept. of Aeronautical Engineering. Rosemount Aeronautical Laboratories, Minneapolis, Minn. Apr 1953. 79p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 133014

Gas temperature probes are described which have excellent performance at high temperatures and low densities. The probes are triple shielded, total temperature type probes made of platinum and rhodium alloys and are useful as high as 1500°C or more. Both thermocouple and resistance thermometer type probes are descirbed. Approximate calculations of the errors and other performance features of these probes are outlined. Testing these probes is a very difficult problem since a highly accurate reference temperature is essential. A good solution to this problem is outlined. Special attention in the testing program was given to proper simulation of the total temperature measuring problem for aircraft in supersonic flight. Experimental results are given. AD 27727. Contract AF 33(938)-30036. AF WADC TR 53-194.

Development, design and construction of an RF mass spectrometer for airborne use, by M.K. Testerman. Arkansas. University. Dept. of Chemistry, Fayetteville, Ark. Dec 1956. 26p fold drawings, diagrs (part fold). Order from LC. Mi $3.30, ph $7.80. PB 132920

AD 116502. Technical note no. 3. 1. Mass spectrometers - Design 2. Contract AF 08(616)-53 3. AF AC TN 57-13 4. AF OSR TN 57-13

Ear-mouth voice transducer, by Henry M. Moser, John J. Dreher, and Lewis J. Schwartzkopf. Ohio State University Research Foundation, Columbus, O. Jul 1957. 18p photos, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 132057

An ear-mouth voice transducer has been experimentally fabricated. The device operates with sufficiently good signal-to-noise ratio to be used without circumaural protection in the noise fields generated operationally by present Air Force propeller-driven aircraft. A small magnetic insert transducer coupled to a custom-fitted earmold, a short length of aluminum tubing, and a small plastic receptacle forming an acoustic link with mouth-emitted speech operates both as a microphone and as a receiver. AD 110071. Project no. 7681. Table is numbered "2". Contract AF 19(604)-1577. AF CRC TN 57-54. OSURF Proj 664., Technical report 43.

Investigation to determine criteria for designing aircraft nose gear steering systems, by Joseph S. Islinger. Armour Research Foundation, Chicago, Ill. Nov 1955. 191p photos, diagrs, graphs (part fold), tables. Order from LC. Mi $8.70, ph $30.80. PB 127677

In order to provide criteria for design of power-actuated aircraft nose gear steering systems, a series of steering tests was conducted on a modified B-26 airplane equipped with such a system. The tests were to provide data regarding the behavior of a steering system under various conditions. Design criteria are delineated in the form of graphs of steering torque as a function of speed for various nose wheel angles. AD 101274. Project 1369, Task 13536. Covers work from 1 Nov 1953-30 Nov 1955 under Contract AF 33(616)-2258. AF WADC TR 55-434.

Maximum number of passengers allowable on any one 5/16-inch distribution line supplied from a high

capacity constant flow regulator, by John M. Sowle. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Feb 1956. 13p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 133023

In designing any distribution system to deliver oxygen from a High Capacity Constant Flow Regulator (100 man regulator), certain pressure drop problems exist. If an individual distribution line provides too many passengers with oxygen, the pressure drop from the regulator outlet to the last passenger will be so great that an inadequate amount of oxygen will be available to the last passenger on that line. A study was made of the maximum allowable pressure drops on three common types of distribution lines. AD 103100. Project 6350. Task 63101. AF WADC TN 56-106.

Model optical glide path indicator system, by William M. Strouse and Thomas P. Fahy. Perkin-Elmer Corporation. Engineering and Optical Division, Norwalk, Conn. Apr 1957. 26p photos, fold drawing, diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 133155

This contract has covered the design and construction of a breadboard model of a projection optical system which is to be one of 14 identical projectors comprising an improved Optical Glide Path Indicator System for aircraft landings and carriers. Perkin-Elmer Engineering Report No. 491, 23 February 1956, was written to propose a new system. Contract No. NOas 56-1077-f was entered into 22 June 1956 to cover a design study and to fabricate a model of one unit of the system as described in the engineering proposal. Engineering report 5099. Contract NOa(s)-56-1077f.

Supplement. (Drawings only), by William M. Strouse and Thomas P. Fahy. Apr 1957. 42p fold drawings. Order from LC. Mi $3.30, ph $7.80. Drawings only, to accompany PB 133155. PB 133155s

Study of fire-emergency control system, by Howard W. Naulty. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Jun 1954. 61p photos, diagrs, table. Order from LC. Mi $3.90, ph $10.80 PB 132860

This report describes the study and development of a fire emergency control system for multi-engine aircraft. Operation of a single control handle in the cockpit sets in motion all the functions necessary for fighting nacelle fires, including rapid engine shutdown and preparation for release of the fire extinguishing agent. The survey report, design evaluation, and a design manual for guidance in designing a fire emergency control system appear as appendicies. AD 68002. Appendices were previously issued as CAL V-827-D-1 and CAL V-827-D-2. Contract AF 18(600)-309. AF WADC TR 54-96.

Two display designs for presentation of all flight attitudes, by J. W. Arnold and H. Schlesinger. Stavid Engineering, Inc., Plainfield, N. J. Jul 1954. 56p photos, diagrs. Order from LC. Mi $3.60, ph $9.30. PB 128133

The suitability of possible displays for aircraft attitude, including heading, was considered. Two feasible displays were determined as probably most promising; one chiefly mechanical, utilizing a universally rotatable sphere; and one chiefly electrical, displaying illuminated figures on a cathode-ray screen; two others having merit but not conforming fully to requirements are briefly mentioned. Contract AF 33(616)-2219. AF WADC TR 54-316.

Engines and Propellers

Application of atomic engines in aviation (Primenenіye atomnykh dvigateley v aviatsii), by G. N. Nesterenko, A. I. Sobolev, and Yu. N. Sushkov. 1957. 184p. diagrs, graphs, tables. Order from OTS. $3.00. PB 131908T

The purpose of this publication is to systematize the scattered data in Russian literature on the utilization of atomic power plants in aviation and rocket engineering and to review these data in popular form. The book was published by the Military Press of the USSR Defense Ministry, Moscow, 1957. Translation was prepared by Technical Documents Liaison Office, Wright-Patterson Air Force Base, Ohio.

Eductors for hydraulic systems applied to closed-circuit lubrication systems, by A. W. Hussmann. Pennsylvania State College. Engineering Experiment Station, State College, Pa. Sep 1952. 103p photos, drawings, diagrs, graphs. Order from LC. Mi $5.70, ph $16.80. PB 133222

In addition to operating as a make-up pump the eductor in a closed-circuit lubrication system acts as an automatic stabilizer in that an increase in back pressure will decrease the side inlet flow, and a decrease in pressure will increase that flow until the original total flow is established again. This interaction of the two flows and the pressures at nozzle inlet, side inlet, and outlet is studied in this report. The eductor theory is presented in a form easily applicable to the present problem of eductors in closed-circuit systems as well as to general application for eductors working with hydraulic fluids of the same density in the nozzle and side flow and for eductors with aerated nozzle flow. Extensive experiments have been carried out to study

the influence of design factors and to establish empirical factors for eductors operating with jet engine lubricating oil. Based on theoretical and experimental investigations, design charts are presented from which the design data for a desired performance or the performance data for a given eductor can be readily determined. AD 56085. Contract AF 33(038)-20389. AF WADC TR 53-131.

Effect of "teeth" on the noise from a jet engine, by Derwent M. A. Mercer. Bolt, Beranek and Newman, Inc., Cambridge, Mass. Sep 1954. 28p photo, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133523

The use of nozzle extensions with projections termed "teeth" as a means of reducing the noise output of jet engines has been known for some years. A thorough examination has been made of British data on engines with and without "teeth," and it is found that although the intensity pattern, both in space and in frequency, is altered, the total acoustic power radiated is unchanged. However, the redistribution in frequency is such as to reduce the annoyance value of the noise by a significant amount, which is of value from the standpoint of neighborhood reaction. AD 55696. Project 7211. Contract AF 33(616)-2151. AF WADC TR 54-224.

Influence of engine design parameters and atmospheric conditions on the acoustic power output of turbojet engines, by Norman Doelling, Ira Dyer, and Derwent M.A. Mercer. Bolt, Beranek and Newman Inc., Cambridge, Mass. Jan 1956. 48p graphs. Order from LC. Mi $3.30, ph $7.80. PB 128137

A study has been made, in terms of the variables which can be modified by the engine designer, to determine whether appropriate combinations of these variables may lead to important reductions in noise output of turbojet engines. This study is based on four different dimensionally correct expressions which have been used successfully to predict acoustic power output of a turbojet engine from the gross variables of the jet engine. These expressions, and this study, are limited to conventional turbojet engines that have no jet stream modifiers. A study has also been made to determine the effect of ambient pressure and temperature on the acoustic power output of conventional turbojet engines. This study was also based on the four different expressions mentioned above. Project 7211, Task 71705. Contract AF 33(616)-2151. AF WADC TR 55-477.

Magnetostriction cavitation study of pitting in cast aluminum Packard Diesel engine blocks, by W.G. Schreitz and J.W. Wood. U. S. Naval Engineering Experiment Station, Annapolis, Md. May 1956. 24p photos, diagrs, tables (1 fold). Order from LC. Mi $2.70, ph $4.80. PB 133392

Cavitation studies were conducted in a magnetostriction apparatus to determine if cavitation might be a major factor in the pitting of cast aluminum Packard diesel engine blocks. Cavitation could be produced at the same frequency and amplitude believed to exist in the engine. In a stationary aluminum specimen separated by coolant water from a vibrating steel button (simulating the engine block-vibrating cylinder linear assembly). Tests were made of several coatings for possible use in the repair or prevention of cavitation damage. AD 105729. NAV EES 020002J.

Mixing, diffusion and pressure recovery in the ejector jet, by S.M. Yen, G.L. Armstrong, R.W. McCloy, and others. Illinois. University. Aeronautical Engineering Dept., Urbana, Ill. n.d. 77p drawings, diagrs, graphs. Order from LC. Mi $4.50, ph $12.30. PB 130919

An analysis was made of the pressure recovery in the ejector jet for various air-fuel ratios, altitudes and Mach numbers. A method was devised for determining the maximum pressure recovery possible with irreversible mixing of the fuel and air. Causes of non-isentropic mixing were discussed. Includes Appendix I: Calculation of isentropic pressure recovery, by R.W. McCloy. Appendix II. Air forces flow, at high velocities in particular with laminar flew, by J. Ackeret. ATI 56570. Date 1947 or later. Report 9-6. Some pages will not reproduce well. Contract N6 ori-71, T.O. IX, NR 220-004.

Noise produced by aircraft during ground run-up operations, by W.E. Clark, A.C. Pietrasanta, and W.J. Galloway. Bolt, Beranek and Newman, Inc., Cambridge, Mass. Jun 1957. 151p drawings, diagrs, graphs, tables. Order from LC. Mi $7.50, ph $24.30. PB 133209

Measurements of the noise field around six turbojet aircraft (T33-A, F89-D, F84-G, B-57, F84-F and F86-D) and one propeller aircraft (C-124) during ground run-up operations are reported. Sound pressure levels in octave bands of frequency have been obtained for different operating conditions of the aircraft engines, at distances ranging from 100 to 1600 ft. These data are analyzed and the results reported in terms of acoustic power level, directivity, and noise spectra. An empirical procedure is described for making engineering estimates of the characteristics of the noise field produced during ground run-up operations of jet aircraft. AD 130763. Project 7210. Contract AF 33(616)-2518. Contract AF 33(616)-3335, Task 23. AF WADC TN 56-60.

Performance of a free-piston Diesel four-stage air compressor, by A.L. London, Walter E. Rafert, and William H. Chamberlain. Stanford University. Dept. of Mechanical Engineering, Stanford,

Calif. Mar 1951. 55p photos, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 130597

This report describes in detail a Junkers free-piston Diesel four-stage air compressor and presents comprehensive test performance results. These data are analyzed in terms of overall system performance, compressor performance, and engine section performance. The main conclusion reached regarding this revolutionary type of internal combustion engine is that the technical advantages of light weight, simplicity of construction, ease of maintenance, and vibration free operation more than compensate for the admitted difficulties of the thermodynamic-dynamic analysis necessary for a preliminary design. AD 123101. Contract N6 onr-251, T.O. 6, NR 035-104. SU ME TR FP-2.

Propagation of stall in a compressor blade row, by Frank E. Marble. California Institute of Technology. Daniel and Florence Guggenheim Jet Propulsion Center, Pasadena, Calif. Jan 1954. 51p diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 130722

Recent experimental observations on compressors, in particular those of Rannie and Iura, have clarified some features of the phenomenon of stall propagation. Using these observations as a guide, the process of stall in an airfoil cascade has been characterized by a static pressure loss across the cascade which increases discontinuously at the stall angle, the turning angle being affected in only a minor way. Deductions from this simple model yield the essential features of stall propagation such as dependence of the extent of stalled region upon operating conditions, the pressure loss associated with stall, and the angular velocity of stall propagation. Using two-dimensional approximation for a stationary or rotating blade row, free from interference of adjacent blade rows, extent of the stalled region, the total pressure loss and stall propagation speed are discussed in detail for a general cascade characteristic. Employing these results, the effect of stall propagation upon the performance of a single stage axial compressor is illustrated and the mechanism of entering the regime of stall propagation is discussed. The essential points of the results seem to agree with experimental evidence. AD 29759. Contract AF 18(600)-178, Technical report no. 4.

Study of a dynamic balancing system for helicopter rotor blades, by D. Thompson and John J. Sciarra. Prewitt Aircraft Company, Clifton Heights, Pa. Feb 1957. 106p photos, diagrs, table. Order from LC. Mi $5.70, ph $16.80. PB 132763

A study is made of requirements for mass balance matching of helicopter rotor blades. Blade balancing operations are studied from both analytical and practical standpoints. Standards and masters for blade balancing are considered, a preliminary balancer design study is conducted, and a "mock-up" balancer is constructed and tested which substantiates the design approach. Report no. 133-92-1. Contract NOas 56-912-C, Final report.

Aerodynamics

Aerodynamic lag in lateral control-free dynamic stability (including a method for its inclusion in design), by Martin Goland, Richard G. Hager, and Yudell L. Luke. Midwest Research Institute, Kansas City, Mo. May 1954. 66p tables. Order from LC. Mi $3.90, ph $10.80. PB 133524

The classical five-degree-of-freedom lateral stability equations are modified to incorporate the effects of unsteady airforces, including the unsteady sidewash contributions of the wing and fuselage. Parameter variations are made on a hypothetical aircraft to determine the error incurred on the short period yawing oscillation obtained in stick-free lateral stability calculations in neglecting unsteady flow theory. For the incompressible flight condition 22 cases are included, while 7 representative cases are chosen to demonstrate the effects of compressibility at a M = 0.7 flight condition. In addition, 2 cases serve to illustrate the importance of vertical tail sidewash lag on the three-degree-of-freedom "snaking" system. AD 59405. Task 13542. Contract AF 33(616)-143. AF WADC TR 54-259.

Aerodynamic studies. See entry under Bibliography on page 205. PB 131973

Aerodynamics of bodies in non-uniform flow, by Enrico Pistolesi and Marino Marini. Pisa. University. Institute of Aeronautics, Pisa, Italy. n.d. 48p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 127108

1. Airfoils—Aerodynamics—Italy. 2. Airfoils—Aspect ratio—Italy. 3. Airfoils—Velocity distribution—Italy. 4. Air flow—Theory—Italy. 5. Contract AF 61(514)-872. 6. AF OSR TR 56-37. AD 96513.

Assessment of body lift contributions and of linearized theory for some particular wing-body configurations, by John W. Reyn and Joseph H. Clark. Polytechnic Institute of Brooklyn. Dept. of Aeronautical Engineering and Applied Mechanics, Brooklyn, N.Y. Jun 1956. 73p graphs. Order from LC. Mi $4.50, ph $12.30. PB 132964

A configuration composed of a circular half cone mounted beneath a swept wing with zero thickness is studied in order to determine whether the lift induced in the system by the cone in supersonic flow is produced efficiently enough to provide, at

practical values of the lift coefficient, significant reductions in the pressure drag. AD 96511. Project no. $-352-30-12. Contract AF 18(600)-693. PIB AL 305. AF OSR TN 56-429.

Bow waves in hypersonic flow, by P. R. Garabedian. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Apr 1957. 26p diagr. Order from LC. Mi $2.70, ph $4.80. PB 133533

A method is described for calculating examples of hypersonic flow with a detached bow shock wave past a bluff axially symmetric body. The form of the shock wave is assumed, and the analysis is based on a Cauchy problem for the stream function in the subsonic region, where the motion is governed by a partial differential equation of elliptic type. Through analytic continuation into the complex domain, the Cauchy problem is reformulated in such a manner that it becomes properly set in the subsonic region. Contract Nonr 225(11), NR 041-035. SU AMSL TR 62.

Calculation of supersonic flow past slowly oscillating bodies of revolution by use of electronic computers, by Johann Muench. Munich. Technische Hochschule, Munich, Germany. n.d. 21p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132973

A method is considered for the calculation of linearized supersonic flow around slowly oscillating bodies of revolution by means of electronic computers. The calculation of the pressure is reduced to matrix operations. Triangular matrices, the elements of which are hyperbolic cosines or square roots, or linear combinations of them are dealt with. AD 136662. Technical note no. 2. Date is 1957 or later. Contract AF 61(514)-1080. AF OSR TN 57-673.

Characteristics of trailing-edge spoilers, by R. T. Patterson. U. S. David Taylor Model Basin, Washington, D.C. Order separate parts described below from LC, giving PB number of each part ordered.

Part I: Effects of turbulent boundary-layer thickness on the characteristics of two-dimensional spoilers at two supersonic Mach numbers. Aug 1952. 32p photos, drawing, diagr, graphs. Mi $3.00, ph $6.30. PB 134261

A wind-tunnel investigation of trailing-edge spoilers in transonic and supersonic flow to determine the practicability of their use as control surfaces for guided missiles has been divided into four phases. Phase 1, the subject of this report, covers the effects of turbulent boundary-layer thickness on the surface pressure distribution forward of two-dimensional spoilers. DWTMB AERO 827, Part I.

Part II: Effects of gap, flap deflection angle, thickness, and sweep angle on the aerodynamic characteristics of two-dimensional spoilers, and the pressure distribution near the tip of a partial-span trailing-edge spoiler, at Mach number of 1.86. Dec 1952. 35p photos, drawings, graphs. Mi $3.00, ph $6.30. PB 134383

The trailing edge of a supersonic airfoil must be blunt for the use of plain trailing-edge spoilers. The thickness of this blunt trailing edge will normally be less than 5 percent of the chord. Two methods were investigated for obtaining spoiler deflected heights greater than this thickness. The first allowed a gap to appear between the spoiler and the airfoil, the second allowed a flap to deflect up to 90 degrees. The plain spoiler, the gap spoiler, and the flap spoiler are compared at a Mach number of 1.86. DWTMB AERO 827, Part 2.

Part III: Normal-force and pitching-moment characteristics of full- and partial-span trailing-edge spoilers on wedge airfoils of various spans and sweep angles at Mach numbers from 0.4 to 2.6. Aug 1953. 79p photos, diagrs, graphs (part fold), tables. Mi $4.50, ph $12.30. PB 134262

This report presents the results of an investigation of the aerodynamic characteristics of trailing-edge spoilers on wedge airfoils. The Mach number, wedge span and sweep angle, and spoiler span and height were varied systematically. DWTMB AERO 827, Part 3.

Comparison of the characteristics of a hydrofoil under cavitating and noncavitating operation, by T. Yao-tsu Wu and Byrne Perry. California Institute of Technology. Hydrodynamics Laboratory, Pasadena, Calif. Sep 1955. 53p diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 130625

1. Hydrofoils—Cavitation—Theory. 2. Contract Nonr 220(12). 3. CIT HL 474. AD 46461. Bureau of Ships project NS 715-102.

Design and performance of a free-jet supersonic wind tunnel for explosion experiments, by Tung-Sheng Liu, Mary J. Teigen, and E.G. Voltin. Minnesota. University. Institute of Technology. Dept. of Aeronautical Engineering. Rosemount Aeronautical Laboratories, Minneapolis, Minn. Jun 1954. 37p photos, diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 133268

An enclosed supersonic free-jet wind tunnel of test section size 6x6 inches for explosion experiments

has been designed and built which produces satisfactory flow through its entire free jet length. Excellent plenum chamber pressure control is provided by a double-wedge center-body type variable diffuser. Four sets of supersonic nozzle blocks were designed for this configuration at Mach numbers 1.5, 2.0, 2.5, and 3.0. Report R-357-40-7. Research report 107. Contract AF 18(600)-599. AF OSR TN 54-290.

Development of a ram wind-tunnel for supersonic research, by Robert A. Hermann. U. S. Air Force. Air Research and Development Command. Missile Development Center, Holloman Air Force Base, N. Mex. Feb 1958. 81p photo, drawing, diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 133317

A ram-inlet wind-tunnel combination offers promise for use as a practical apparatus for aerodynamic research. Reference is made to its operation as a supersonic vehicle on guide rails. Data from design analyses cover track Mach numbers ranging from 2 to 4. Tentative solutions are proposed for problems of propulsion, aerodynamic drag reduction, velocity control, and recovery. AD 123735. Project 6876, Task 68755. AF MDC TR 58-1.

Effects of the upstream influence of a shock wave at supersonic speeds in the presence of a separated boundary layer, by Lloyd E. Daniels and Hideo Yoshihara. U. S. Air Force. Air Research and Development Command. Wright-Air Development Center. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton, O. Jan 1954. 31p photos, diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 133166

The influence of Reynolds number and Mach number on the flow at supersonic speeds over blunt bodies with a slender spike attached in front is investigated. For each body configuration the drag has been measured by strain gage balance, and the details of the flow pattern have been obtained by means of the schlieren apparatus. AD 34209. AF WADC TR 54-31.

Estimation of stability derivatives from theory and flight test for a tandem helicopter in forward flight, by Gilbert Chuck. U. S. Air Force. Air Research and Development Command. Air Force Flight Test Center, Edwards Air Force Base, Calif. Apr 1957. 49p diagrs, graph. Order from LC. Mi $3.30, ph $7.80. PB 133345

This paper describes theoretical and flight test estimation of the stability derivatives considered necessary for a first approximation to the dynamic characteristics of a tandem helicopter in forward flight. These derivatives may be used with linear equations of motion. An example is presented to show the validity of the approximation. Comparison of analog computer solutions and flight test time histories shows that a first approximation is obtained. A refinement of the derivatives provided a better approximation. AD 118720. AF FTC TN 57-14.

Flutter characteristics of low aspect ratio wings in incompressible flow. Part I: Development of the basic theory of the method, by H.R. Lawrence and H.N. Stone. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. May 1957. 35p diagrs, table. Order from LC. Mi $3.00, ph $6.30. PB 130931

The method for determining the aerodynamic characteristics of low aspect ratio wings oscillating in an incompressible flow which has recently been developed at the Cornell Aeronautical Laboratory is combined with the equations of motion of a vibrating wing to produce a relatively simple flutter analysis procedure. The newly-developed method has been worked out for both symmetric and antisymmetric wing mode shapes. AD 118348. Project no. 1370. Contract AF 33(616)-317. AF WADC TR 54-412, Part 1.

Graphical and tabulated data on the frequency and modal characteristics of swept cantilevers, by A.H. Hallk, Helen A. Tulloch, H.F.L. Pinkney, and A.C. Sarazin. Canada. National Aeronautical Establishment. Structures Laboratory, Ottawa, Canada. Jun 1957. 99p diagrs, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 132932

This report relates to the vibration of swept cantilevers with parallelogram planform, and contains comprehensive data on the frequency and modal characteristics which are of use in the application of semi-rigid analysis to preliminary design studies of missile and aircraft dynamics. It contains charts of frequency coefficients as a function of angle of sweep, aspect ratio, and rigidity ratio, together with interpolation tables covering the corresponding modes and running amplitude ratios (nodal coordinates). A brief discussion of profile camber is illustrated with experimental data, as are the charts and modal tables. NAEC LR-193.

Interference factor for multifinned tail assemblies in supersonic flow, by J. Leith Potter, Norman M. Shapiro, and William D. Murphree. U. S. Redstone Arsenal. Ordnance Missile Laboratories, Huntsville, Ala. May 1956. 29p photos, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80 PB 133008

The problem of calculating normal forces produced by multifinned tail assemblies in supersonic flow is considered, and a solution based on a multifin interference parameter is described. Experimental data representing a variety of tail configurations

are presented in support of the interference parameter. These data cover four-, six-, and eight-finned tails of typical design in the range of Mach numbers between 1.73 and 4.24. Centers of pressure of the normal force on the tail assembly are briefly discussed and experimental results shown. Project TB 2-0001. RSA OML R 2R12F.

Jet effects on the aerodynamic coefficients of a cone-cylinder at a Mach number of 0.5, by J.E. Long. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1957. 14p photos, graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 132819

Cone-cylinder models were fired in the Pressurized Ballistics Range at a Mach number of 0.5 to study the effects produced by a jet of CO_2 exhausting from a "Sparklet" bulb at the bases of the models. AD 127906. NAVORD 4435. NOL ARR 366.

Method for predicting dynamic landing loads, by Richard L. Eisenman and Edward H. Kramer. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton O. Sep 1954. 49p diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133164

Dynamic responses may be computed as the sum of the rigid body response and the vibratory responses in each normal mode. The rigid body response is determined first from basic airplane parameters and in this report is assumed trapezoidal in shape. This trapezoid is then applied to the equation of motion of the elastic system to determine the vibratory response. The vibratory response of an elastic system to a trapezoidal forcing function can be computed algebraically or graphically. New computation forms are provided for both the algebraic and the graphical methods. Three particular problems are solved to compare theoretical and measured results, to serve as a computation guide and to illustrate the flexibility of the approach. In the first problem the effect of varying basic parameters is discussed with a flow chart. AD 49027. Project 1367. (This report supersedes memorandum report MCREXA5-4595-8-2, 20 Feb 1948). AF WADC TR 54-28.

On the aerodynamic heating of blunt bodies, by E.R. van Driest. North American Aviation, Inc. Missile Development Division, Downey, Calif. Nov 1957. 34p graphs. Order from LC. Mi $3.00, ph $6.30. PB 133968

Calculation of the heating rate for blunt bodies in high-speed flight, including the phenomenon of transition, is discussed. Analysis of the problem with transpiration cooling is presented. AD 136-716. MD 58-6. Contract AF 49(638)-250. AF OSR TN 57-732.

Procedures for including temperature effects in structural analysis of elastic wings. Part I: An equivalent plate method of structural analysis for elevated temperature structures, by William R. Mills. Massachusetts Institute of Technology. Aeroelastic and Structures Research Laboratory, Cambridge, Mass. Jan 1958. 42p diagrs, graphs, tables. Order from OTS. $2.25. PB 131989

Some of the structural problems of a heated wing are discussed with specific emphasis on the necessary additions or changes needed in the standard non-thermal methods of analysis to include non-uniform temperature distribution in the structure. With the plate-like hypothesis as a starting point the differential equations of static deflection, including finite deflection terms, have been derived. The specific structural problems which can be derived as specializations of the general deflection equations are stress analysis, deflection analysis, wing divergence and aileron effectiveness. A proposed solution of the assumed mode method is outlined. The equations governing the dynamic properties of the wing are derived by including the inertial force in the pressure term of the vertical equilibrium equation. The aerodynamic loads are described using piston theory aerodynamics. Appendix A presents a simple method for estimating depthwise anti-symmetrical temperature effects in an aerodynamically heated wing. Appendix B shows analytically the effect of time dependent stiffness on the response to a unit impulse of a one-degree-of-freedom system. AD 142234. Project 6-(8-1367). Task 13584. Contract AF 33(616)-3517. AF WADC TR 57-754, Part 1.

Preliminary wind tunnel tests of a lifting fan in a two dimensional aerofoil, by R.L. Wardlaw and R.N. Templin. Canada. National Aeronautical Establishment. Aerodynamics Section, Ottawa, Canada. Sep 1957. 20p photos, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132934

This report outlines preliminary wind tunnel tests done with a two-dimensional aerofoil with a single fan mounted in the wing. The results indicate that the highest lift increments due to the fan occur at high speeds, and that there is a minimum increment at small forward speeds. The drag increment due to the fan increases rapidly with increasing speed. The pitching moment increment has a maximum at low forward speeds, and the centre of pressure of the fan lift shifts forward of the wing leading edge at these speeds. A simple momentum theory is developed which provides reasonable agreement with the test results at low speeds. The use of fan outlet guide vanes to reduce drag is discussed, and the results of one test are presented. NAEC LR 207.

Review and summary of the available aerodynamic data on deflected slipstream arrangements suitable for VTOL applications, by J.A. Dunsby. Canada. National Aeronautical Establishment.

Aerodynamics Section, Ottawa, Canada. Sep 1957. 27p diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 132933

A review is made of the existing experimental and theoretical aerodynamic data on wing-propeller combinations intended for vertical take-off utilizing the deflected slipstream principle. NAEC LR-205.

Rolling pullout study. Cornell Aeronautical Laboratory, Buffalo, N. Y. Contract W-33(038)-18517. Project 1367, Task 13581. Order separate parts described below from OTS, giving PB number of each part ordered.

Part I: Development of a large disturbance theory for calculating airplane motions and tail loads in a rolling pullout maneuver, by Donald W. Rhoads and James C. O'Hara. Jul 1957. 99p diagr, graphs graphs, table. $2.50. PB 151018

This report presents an attempt to develop a method to predict within practical limits the motion and tail loads of an airplane in a rolling pullout maneuver. The initial set of equations represent all six degrees of freedom of a rigid body including consideration of large disturbances, non-linearities and cross coupling of stability derivatives, etc. These equations were solved by the IBM computing facilities of the National Bureau of Standards. The complete equations for a maneuver starting from a true banked turn are also given in this report. AD 130877. AF WADC TR 6701, Part 1.

Part III: Comparison of calculated and measured airplane motions and ail loads during typical rolling pullout maneuvers, by Donald W. Rhoads. Jun 1957. 76p graphs, table. $2.25. PB 151017

As a check of the theoretical equations of motion of Part I of this study, comparisons between flight test data on rolling pullout maneuvers of Part II and calculations based on the theoretical equations and the flight test conditions and control input are presented for eight different flight test conditions including differences in Mach number, altitude, c.g. positions, moments of inertia and input sequences. The response time histories are plotted for normal acceleration, sideslip angle, rolling velocity, roll angle, yawing velocity, and horizontal and vertical tail loads. The aerodynamic characteristics used in these calculations are based on wind tunnel data and typical expressions for stability derivative estimation. AD 130878. AF WADC TR 6701, Part 3.

Tangential blowing on the surface of an airfoil as a boundary-value problem, by S.T. de los Santos. U. S. David W. Taylor Model Basin, Washington, D.C. Nov 1954. 25p photos, diagrs, table. Order from LC. Mi $2.70, ph $4.80. PB 134264

Two-dimensional tangential blowing is considered as a mixed boundary-value problem in a perfect fluid. The airfoil is assumed to be transformed into a unit circle. The boundary conditions on the circle are such that the pressure or sink distribution is prescribed along an arc and the normal velocity is zero elsewhere. The flow field is then determined. DWTMB AERO 872.

Three-dimensional supersonic flutter model tests near Mach number 1.5. Part 1: Model design and testing techniques, by John F. McCarthy, Jr., Gifford W. Asher, John S. Prigge, Jr., and Gilbert M. Levy. Massachusetts Institute of Technology. Aeroelastic and Structures Research Laboratory, Cambridge, Mass. Dec 1955. 44p photos, diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 133373

The design and construction of a series of supersonic flutter models are described. The techniques of static, vibration, and flutter testing are discussed. Some recommendations for future model design and testing are presented, and evaluation of the present methods is made. The accuracy of the various measurements is discussed. AD 103035. Project 1370, Task 13474. AF WADC TR 54-113, Part 1.

Wall corrections for a wing near a ground plate in a circular cross section wind tunnel, by J. P. Albritton and F.J.A. Huber. U. S. Air Force. Air Research and Development Command Wright Air Development Center. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton, O. Jun 1955. 27p diagrs, graph. Order from LC. Mi $2.70, ph $4.80. PB 133191

1. Flow, Incompressible—Wind tunnel tests. 2. Wings—Lift. 3. AF WADC TR 55-280. AD 94602. Project 1366, Task 70172.

Rockets and Jet Propulsion

Frequency response of pressure pickups required for measurements on a pulse-jet, by George Rudinger. Cornell Aeronautical Laboratory, Inc. Buffalo, N.Y. Jun 1947. 6p graphs, table. Order from LC. Mi $1.80, ph $1.80. PB 132875

A theoretical pressure cycle of a pulse jet is analized by means of a Fourier series development and the conclusion is reached that uniform frequency response up to about six times the cycle frequency is the minimum requirement for a pressure pickup to obtain a reasonable recording of the wave form. By studying another, more idealized cycle it is shown that this result not only holds for the special cycle selected but also applies to a wide range

of wave forms which may be expected to occur in modern pulse jets. The frequency response required is not specified in absolute values but in terms of the cycle frequency, which may have widely different values in different jets. Contract N6 ori-119, T.O. 1, Technical report no. 1. CAL TM 1.

Manual for handling missile propellants. Pan American World Airways. Guided Missiles Range Division, Patrick Air Force Base, Fla. Jan 1958. 270p photos, drawings, diagrs, tables. Order from LC. Mi $11.10, ph $42.60. PB 132889

Sections are devoted to liquid oxygen; liquid and gaseous nitrogen; nitric acid; hydrogen peroxide; fuels (hydrocarbons); unsym-dimethyl hydrazine (UDMH), u-delta blend; aniline; methyl, ethyl, and furfural alcohol; ethylene oxide. AD 134277. AF MTC TR 58-7.

Method of calculating the performance of liquid propellant systems containing the species C, H, O, N, F, and one other halogen, with tables of required thermochemical properties to 6000°K, by J.S. Martinez and G.W. Elverum, Jr. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Dec 1955. 91p tables. Order from LC. Mi $5.40, ph $15.30. PB 132959

This memorandum assembles and summarizes all the information necessary to calculate the performance (specific impulse and characteristic exhaust velocity) of rocket propellant systems containing any or all of the components C,H,O,N,F, plus one additional halogen. A method is outlined for solving the simultaneous equations involved in making an accurate performance calculation. Tables are included which list enthalpy, entropy, and equilibrium constants for all the substances involved, in the temperature range from 300 to 6000°K. The heats of formation Q_f are tabulated for most atomic and molecular species of interest, and space has been provided for the user to add other Q_f values as desired. Outlines are appended of the methods used to calculate high-temperature thermochemical properties for ClF and BrF. Contract DA 04-495-ord-18. CIT JPL M 20-121.

Preliminary experimentation on the CAL 6" x 4" pulse jet, by John G. Wilder, Jr. Cornell Aeronautical Laboratory, Inc., Aerodynamics Dept. Propulsion Branch, Buffalo, N.Y. Jun 1947. 25p photos, diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80 PB 132882

Preliminary experimentation of an exploratory nature was undertaken by the Cornell Aeronautical Laboratory's Burner Group on a 6" x 4" pulse-jet. Various reed thicknesses, two reed materials, two lengths of combustion chambers and various fuel injection systems were tested. Project Squid. Contract N6 ori-119. CAL DD 420-A-6. CAL TM 6-M.

Relativistic treatment of rocket kinematics and propulsion, by Paul F. Von Handel and Herbert Knothe. U. S. Air Force. Air Research and Development Command. Missile Development Center, Holloman Air Force Base, New Mexico. Jan 1958. 88p diagrs, graphs, table Order from LC. Mi $4.80, ph $13.80. PB 133316

The general kinematics and propulsion of space vehicles are studied within the framework of the special theory of relativity. The reception and expulsion of particles and photons by a space vehicle as well as their kinematical effects are examined in detail. The optimization of the final velocity of the vehicle is determined as a parametric function of the available energy and of the final mass (pay load). Illustrative numerical examples are included when appropriate. AD 135004. AF MDC TR 58-3.

Time-varying analysis of a guidance system, by Bernard Friedland. Columbia University. School of Engineering. Dept. of Electrical Engineering, New York, N.Y. Oct 1957. 34p diagrs, graph, table. Order from LC. Mi $3.00, ph $6.30. PB 133180

In a recent paper the author presented a method of analyzing time-varying sampled-data systems. The essential features of this method are the characterization of components by triangular transmission matrices, and the use of ordinary matrix algebra to evaluate system performance. The purpose of the present paper is to illustrate by a typical problem how this method can be used in practical situations. The problem selected is that of steering a missile toward a target (both of which travel in a common plane) by means of a closed-loop control system. In addition to the intrinsic importance of this problem, the procedure one uses in the matrix analysis the system is characteristic of a variety of problems. AD 136733. Project 47501. CU-37-57-AF-677-EE. Table labelled Table II. Contract AF 18(600)-677. CUN ERL TR T-23/B. AF OSR TN 57-746.

Land Transportation

Application of a variable pitch propeller as a booster of lift and thrust for amphibian vehicles, by M.G. Bekker. U. S. Ordnance Corps. Ordnance Tank Automotive Command. Research and Development Division. Land Locomotion Research Branch, Detroit, Mich. May 1957. 24p photo, diagr, graphs. Order from LC. Mi $2.70, ph $4.80. PB 133425

3. Seaplanes—Aerodynamics. 2. Propellers—Lift. 3. Propellers—Thrust. 4. ORD OTAC 14.

Measurement of instantaneous velocity of track vehicles, by Heinz T. Schwinge. U. S. Air Force. Air Research and Development Command. Missile Development Center, Holloman Air Force Base, N.M. Mar 1958. 21p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 133959

This report describes how the instantaneous velocity of a vehicle can be computed from a combination of space-time data and accelerometer measurements. An error analysis investigates the accuracy obtainable. Equations for best spacing, depending on the accuracy of space-time and acceleration data and the vehicle velocity, are given. AD 135013. Project 6876, Task 48500. AF MDC TR 58-5.

Mobility on land, challenge and invitation, by M.G. Bekker. U. S. Ordnance Corps. Ordnance Tank Automotive Command. Research and Development Division. Land Locomotion Research Branch, Detroit, Mich. May 1957. 17p photos, diagrs, graph. Order from LC. Mi $2.40, ph $3.30. PB 133424

With the development of a new discipline which would play the same role in land locomotion as fluid mechanics plays in sea and air transport development, it seems quite possible to more rationally adapt vehicles forms to the environment of operation, and to radically change the mobility situation. Evidence has been produced that such a morphological progress in vehicle design may produce much better and quicker results in improving off-the-road operations than those produced by the present purely technological progress stemming from highway vehicle development. ORD OTAC R 15.

Terrain evaluation in automotive off-the road operations, by M.G. Bekker. U. S. Ordnance Corps. Ordnance Tank Automotive Command. Research and Development Division. Land Locomotion Research Branch, Detroit, Mich. Mar 1957. 41p photos, diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 133426

Commercial developments in off-the-road locomotion embrace a wide field in which earth moving, logging and agricultural operations are most common. In all these cases the ground is both the source of a resistance to motion and the medium which provides propelling forces. Thus, in order to assess any of such operations studies of soil resistance imparted to moving bodies and of soil strength required to provide the motive power have to be performed. Consequently, an exact knowledge of terrain values which affect locomotion must be considered of paramount importance in a competitive economy if an operation is to result in the expected profit. ORD OTAC R 13.

Biology of marine fouling growths on and adjacent to the bottom. Annual report covering period 1 Jan-31 Dec 1956, under Contract Nonr 396(06), by Donald J. Zinn and Richard D. Wood. Rhode Island. University. Narragansett Marine Laboratory, Kingston, R.I. Jan 1957. 21p graphs. Order from LC. Mi $2.70, ph $4.80. PB 132633

The severity of fouling on the test apparatus is shown to depend on the season of the year, the distance of the testing apparatus from the bottom, the rate at which the attached organisms grow, the bulk attained by successive layers of growth, and the length of time the test apparatus remains in position. Ref. 57-4. For earlier annual report see PB 126562. Contract Nonr 396(06), NR 163-312.

Description and properties of type B silver-silver chloride reference electrode for cathodic protection, by J. Oser. U. S. Mare Island Naval Shipyard. Rubber Laboratory, Vallejo, Calif. Mar 1956. 14p photo, col. fold, drawing. Order from OTS. 50 cents. PB 131581

The Rubber Laboratory has developed a new type of trailing reference electrode for use in cathodic protection of ships. This electrode, designated as Type B, is a modified version of the silver-silver chloride which had been previously prepared by the Laboratory (now designated as Type A). The Type B electrode is particularly adapted for use in waters of wide range of salinities. Its potential is affected less than that of the Type A electrode by agitation of the aqueous medium in which it is immersed. Project no. NS-033-005. NAVSHIP RL 11-4.

Determining the relative volume of the annual flow of Pacific waters into the Arctic Ocean through Bering Strait. (K opredeleniiu poriadkovoi velichiny godovogo stoka vod Tikhogo okeana v Severnyi ledovityi okean cherez Beringov proliv), by I.V. Maksimov. Translated by Valda Dreimanis. Jun 1956. 14p diagr, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 125122

Gives the results of an attempt to determine the order of the mean monthly volume of the summer flow of Pacific waters into the Atlantic Ocean through Bering Strait and the order of magnitude of the annual flow. Translated for the Geophysics Research Directorate, Air Force Cambridge Research Center by the American Meteorological Society under Contract AF 19(604)-1364 from Problemy Arktiki, (2): 51-58, 1945.

Effect of a single fish on low frequency sound propagation, by Malcolm M. Coate. U. S. Naval Ordnance Laboratory, White Oak, Md. Apr 1957. 19p graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 133951

Measurements have been made of the effect of a single fish on underwater sound transmission in the frequency range of 100 to 1000 cps. The experimental results were found to be in very good agreement with the effect predicted on the basis of an ideal spherical air bubble of volume equivalent to that of the fish's air bladder plus an arbitrary additional loss term. This indicates that a theoretical treatment of the problem of many fish may be based on air bubbles of this type. Foundational research project: FR 45. NAVORD 4514.

Experimental physical oceanography, by C. O'D. Iselin. Woods Hole Oceanographic Institution, Woods Hole, Mass. Jan 1957. 53p photos, graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 133445

Covers research during the period Jun 1-Dec 31, 1956 on studies of the ocean circulation, wind stress on smooth water surfaces, atmospheric circulation; wide field photographic optics, and time-lapse cinephotography from shipboard. Contract Nonr-1831(00), NR 083-107. WHOI Ref 57-12.

Experiments with tanker models V. by Hans Edstrand, E. Freimanis, and Hans Lindgren. Sweden. Staten Skeppsprovningsanstalt, Gothenberg, Sweden. 1956. 25p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 127024

The experiments were concerned with the study of the influence of the longitudinal position of the centre of buoyancy. They form a direct continuation of the tests with the block coefficient variation group. Ship models were tested for resistance and self-propulsion in still water. Results of the whole investigation are summarized in a paper, "Experiments with tanker models," by Hans Edstrand, published in vol. 72 of Transactions of the North East Coast Inst. of Eng. and Shipbuilders. For experiments II and IV see PB 116760 and 119905. I and III are issued as Meddelanden no. 23 and no. 29. Sweden. Staten Skeppsprovningsanstalt, Goteberg, Sweden. Meddelanden nr. 37.

Introduction to underwater sound. Pennsylvania State College. School of Engineering. Ordnance Research Laboratory, State College, Pa. Dec 1946. 55p diagrs, graphs (part col.). Order from LC. Mi $3.60, ph $9.30. PB 130927

This material is intended to introduce to a newcomer in the field of acoustics, particularly as applied to underwater sound, the fundamental relationships of pressure, intensity, power and acoustic resistance, and the use of the decibel scale in comparisons of these quantities. The characteristics of an underwater transducer are described, and the sensitivity to pure tone and noise are discussed. There is presented a rather elaborate method for determining the sensitivity, calculated efficiency, and directivity index of a transducer. The theory and discussion presented in the report are illustrated by numerous examples which are worked out from typical situations. Serial no. Nord 7958-38. Color will not reproduce.

Large temperature controlled sea water bath, by Jerome Williams. Johns Hopkins University. Chesapeake Bay Institute, Baltimore, Md. Dec 1956. 11p photo, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 133931

Among the more urgent problems facing oceanographers is the accurate and repeated calibration of instruments used in the field. To solve this problem in a convenient manner, the Chesapeake Bay Institute has developed a controlled temperature bath large enough to accommodate any instrument now in use by the Institute. It has proved satisfactory for routine calibration of the Institute's basic field instrument, the Conductivity-Temperature-Indicator. Since it is felt that the method of control is rather uncommon, the discussion is devoted principally to this feature. Technical report XI. Reference 56-4. Contract Nonr-248(20), NR083-016. Contract Nonr-248(30), NR 083-070.

Low frequency acoustic transmission fluctuations at Brighton, Maryland, by Malcolm M. Coate, B. Leroy Hord, and Charles B. Leslie. U. S. Naval Ordnance Laboratory, White Oak, Md. Oct 1956. 47p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 133158

Measurements were made of acoustic transmission fluctuations at the NOL Acoustic Facility, Brighton, Maryland, and a study was carried out of their characteristics and relations to certain parameters. The frequency range studied was primarily 100 to 500 cps. Measurements were made at distances from the source of a few inches to 200 feet. NAVORD 4198.

Model hydraulic breakwater studies, by C.M. Snyder. California. University. Institute of Engineering Research. Wave Research Laboratory, Berkeley, Calif. Apr 1957. 31p diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133535

This report covers studies made in the small wave channel on a horizontal hydraulic breakwater utilizing a number of different jet sizes, jet submergence, cascaded jets, jets over submerged plate and including the measurement of the reactive forces due to the jets. Also a preliminary

hree-dimensional study was made, a preliminary arge scale two-dimensional test run was made, nd a preliminary study was made on the water urrent induced by the jets and water particle mo-ion. Contract Nonr 22246, NR 062-198. UC IER eries 104, Issue 1.

Oxygen requirement and mortality of the blue crab in the Chesapeake Bay, by James H. Carpenter and David G. Cargo. Johns Hopkins University. Chesapeake Bay Institute, and Maryland. Dept. of Research and Education. Cheseapeake Biological Laboratory, Baltimore, Md. Jan 1957. 23p map, diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 126866

. Crabs—Oxygen requirements. 2. Crabs—Mortality. Reference 57-2. Technical report no. IIII.

MISCELLANEOUS

nnual technical report, fiscal year 1950. U. S. Naval Research Laboratory. 1950. 67p photos, graphs. Order from LC. Mi $3.90, ph $10.80. PB 132997

. Scientific research—Progress reports. 2. NRL 3700.

Army Science Conference, West Point, N.Y., 1957. Report, vol. 2. 1957. 540p photos, maps, drawings, diagrs, graphs, tables. Order from LC. Mi $11.10, ph $78.60. PB 132066

Contents: Dissipation of supercooled cloud decks, by H. J. Aufm Kampe, J.J. Kelly, H. Weickmann.—Mobility on land, challenge and invitation, by M.G. Bekker.—Enzymatic debridement of full thickness skin burns, by Abram S. Benenson.—Current Investigation of the human electroretinogram, by William R. Biersdorf, John C. Armington.—The measurement of dynamic strains induced in projectiles during penetration of armor plate, by J. I. Bluhm.—A method for the measurement of the flow of air by means of series of electric sparks, by H.J. Bomelburg.—Infinite clipping and time quantization as a means for obtaining digital speech transmission, by F.E. Bond, A.H. Ross.—Seeing at low levels of illumination, by Morton L.E. Chwalow, Michael F. Amsterdam.—Some properties of thin magnetic films, by Roger W. Clapp, Jr..—The importance of the intestines in experimental hemorrhagic shock in dogs, by R.W. Clarke, R.C. Lillehei.—Evaluation of four-week and eight-week basic training for men of various intelligence levels, by Victor B. Cline, Ira H. Cisin.—The Quartermaster solar furnace, by Eugene S. Cotton, John M. Davies.—Investigations of energy requirements for producing liquid instabilities by jet nozzles and for producing aerosols by single phase liquid nozzles, by J.S. Derr, Jr..—Experimental verification of the nonsteady theory of jet formation by lined cavity charges, by R.J. Eichelberger.—Sampling for destructive or expensive testing by attributes, by Henry Ellner, I.R. Savage.—X-ray method of determining residual stress distributions, by H.R. Erard.—On the motion of the earth satellite, by Boris Garfinkel.—Calculation of specific impulse from bond energies, by George Glockler, John W. Dawson.—Electropolishing—a new tool in cannon manufacturing, by Peter V. Greco.—An atmospheric heat transfer problem with eddy (diffusivity) varying as a power law with height, by H.S. Greenfield.—Meteorological measurements from earth satellite, by R. Hanel, W. Nordberg, R. Stampfl, W.G. Stroud.—The excretion of radioactive fission fragments by man during continental and overseas nuclear tests, by James B. Hertgering, Ariel G. Schrodt, Edward C. Knoblock, Kent T. Woodward.—Coatings for infrared optics and for the satellite, by G. Hass, A.P. Bradford, J. T. Cox.—The two-Debye method of matching the lattice specific heats of binary compounds, by J.A. Hofmann.—An equation for the self absorption of beta and gamma rays, by Arthur Kant.—Microscopic effects produced by alpha irradiation of potassium iodide, by E. R. Levin.—Stability studies of numerical integration methods, by Milton Levy.—Development of automatic leak detection equipment for toxic munitions, by Carl A. Martin.—Disruption of diurnal rhythm of urinary 17-hydroxycorticosteroid excretion in monkeys with bilateral fornix system, by John W. Mason, Walle J. H. Nauta, Nathan R. Rosenthal.—Telemetry and other techniques applied to ballistic measurements of self dispersing bomblets, by T. R. Paulson.—Exterior ballistics and the development of modern aerodynamics, by Charles L. Poor.—A computer-control system for the simulation of aerodynamic heating of structures, by James T. Sawyer.—Automatic scrutinizing of data, by Th—W. Schmidt.—Propagation of flames in a rectangular duct, by L. Shreve, W. W. Wharton, E. Miller.—Aerial survey feasibility study, by Norris E. Sills.—Measurement of the microwave properties of monocrystalline and polycrystalline ferrites, by E.G. Spencer, R.C. LeCraw.—Relationships between persistence, decay constant, and energy input of phosphors, by Jack Steinberg, Elmer L. Offenbacher.—A reflected shock wave technique for studying fast chemical reactions, by Roger A. Strehlow.—Detonation by shock, by M. Sultanoff.—Downwind dosage predictive equations, by William G. Tank.—The shock tube as a research facility, by William J. Taylor.—A continuously recording electron diffraction camera, by Rudolf Thun.—Use of intravenous fat emulsions, by Harold L. Upjohn, Stanley M. Levenson.—Tactical war gaming on a digital computer, by R. E. Zimmerman.

Bioecology of Kapingamarangi Atoll, Caroline Islands: Terrestrial aspects, by William A. Niering. National Academy of Sciences. Pacific Science Board. Washington, D.C. Mar 1956. 75p

maps (part fold), drawings, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 126950

SIM (Scientific Investigations in Micronesia) program has developed as a successor to the former CIMA (Coordinated Investigations of Micronesian Anthropology) project with an enlarged scope that includes field research in the physical, biological, and life sciences. Scientific investigations in Micronesia. Report no. 22. Contract N7 onr-291 (54), NR 388-001.

Report of NRL progress. U.S. Naval Research Laboratory. Sep 1958. 52p. Order from OTS. $1.25. Also available at annual subscription rate of $10.00 a year in U.S.A., foreign rate of $13.00 a year. PB 151130

Contents: Articles: Rocket astronomy, by H. Friedman. - Photonuclear research at NRL, by J. McElhinney, W. L. Bendel, L. Cohen, R. Tobin and M. E. Toms. - Reduction of radio receiver strong-signal interference vulnerability by increase of antenna circuit selectivity, by D. McClenon and C. E. Young. - Scientific program: Problem notes: Applications research: Effects of filtering on the performance of a manual compensatory tracking task.... Interactions between display gain and task-induced stress in the manual tracking system. - Astronomy and astrophysics: IGY solar flare studies.... Atmospheric radioactivity studies. - Chemistry: Relation of wettability by aqueous solutions to the surface constitution of low-energy solids.... Telomerization--a review of the literature. - Mechanics: Investigation of Coanda surface for pulsejet application. - Metallurgy and ceramics: Determination of trace amounts of rhenium in molybdenus.... Development of nonembrittlement cadmium electroplating solutions.... Radiation effects in ferromagnetic metal alloy torroids.... Proposed mechanism for the strengthening of SAP-type alloys .... Radiation damage of materials.... Retained strength of sodium silicate bonded foundry sand.... Corrosion mechanism studies of cast aluminum, diesel engine crank cases. - Nuclear and atomic physics: Strong shock waves in helium-hydrodynamic calculations.... Control and safety rod drives of the NRL research reactor.... Reactor neutron flux measurements and power determination.... Reactor core loadings.... Electron losses in partially ionized gases. - Published reports. - Papers by NRL staff members. - Patents. - Erratum.

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Biology and Medicine

Annual progress report, by C. N. Stover, Jr Utah Univ., Salt Lake City, Utah. Mar 1958. Contract AT(11-1)-119. 192p. Order from LC. Mi $8.40, ph $28.80. COO-215

Electronoscopic particle studies, by R. Borasky. Hanford Atomic Products Operation, Richland, Washington. May 1958. Contract W-31-108-Eng-52. 14p. Order from OTS 50 cents. HW-55172

Biological effects of inhalation of high concentrations of tritium gas, by T. T. Trujillo and others Los Alamos Scientific Lab., Los Alamos, N. Mex. Dec 1955. Contract (W-7405-eng-36). 36p. Order from LC. Mi $3.00, ph $6.30. LA-1986

Radon solubility in body tissues and in fatty acids, by Elmer Nussbaum. Rochester, N. Y. Univ., Rochester, N. Y. Jun 1957. Contract W-7401-eng-49. 169p. Order from LC. Mi $7.50, ph $24.30. UR-503

A method for the determination of plasma corticosteroids, by F. T. Brayer. Rochester, N. Y. Univ., Rochester, N. Y. Nov 1957. Contract W-7401-eng-49. 13p. Order from LC. Mi $2.40, ph $3.30. UR 513

The acute toxicity and retention of intrapertioneally administered polonium^{210} in the rat, by R. J. Della Rosa and J. N. Stannard. Rochester, N. Y. Univ., Rochester, N. Y. Jan 1958. Contract W-7401-eng-49. 13p. Order from LC. Mi $2.40, ph $3.30. UR-519

Chemistry—General

Enrichment of isotopes by the difference in rates of isotopic reactions, by Richard B. Bernstein. Michigan Univ., Ann Arbor, Michigan. Apr 1957. Contract AT(11-1)-321. 25p. Order from LC. Mi $2.70, ph $4.80. AECU-3603

Kinetics of dissolution of UO_2 in sulfuric acid. Technical report no. XXVIII, by Theron L. Mackay and Milton E. Wadsworth. Utah Univ., Salt Lake City, Utah. Sep 1957. Contract AT(11-1)-82. 45p. Order from LC. Mi $3.30, ph $7.80. AECU-3660

Behavior of polyvalent metallic ions in 100% acetic acid; reactions of rare earth compounds in acetic acid, by L. F. Audrieth and J. A. Seaton. Illinois Univ. Noyes Lab. of Chemistry, Urbanna Illinois. Oct 1957. Contract AT(11-1)-67. 84p. Order from LC. Mi $4.80, ph $13.80. AECU-3662

The chemistry and nuclear chemistry of the heavy elements. Progress report no. 3, by J. W. Cobble. Purdue Univ., Lafayette, Ind. Mar 1958. Contract AT(11-1)-347. 115p. Order from LC. Mi $6.00, ph $18.20. AECU-3663

Oxidation of uranium dioxide. Research report no. 100FF942-R2(Revised), by Paul E. Blackburn and others. Westinghouse Electric Corp. Research Labs., Bettis plant, East Pittsburg, Penn. Aug 1957. 22p. Order from LC. Mi $2.70, ph $4.00. AECU-3674

Thorium dissolving-quaterly report (for) period February 1, 1952-May 1, 1952, by D. L. Foster and E. O. Nurmi. Oak Ridge National Lab., Oak Ridge,

Tenn. May 1952. Decl. Feb 1952. Contract (W-7405-eng-26). 7p. Order from LC. Mi $1.80, ph $1.80. CF-52-5-95

Uranium tetrafluoride precipitation studies. Spring quarter, 1957 co-op report, by K. J. Fritz. Oak Ridge National Lab., Oak Ridge Tenn. Sep 1957. Contract (W-7405-eng-26). 28p. Order from LC. Mi $2.70, ph $4.00. CF-57-9-63

Molten salt heat transfer, by H. W. Hoffman. Oak Ridge National Lab., Oak Ridge, Tenn. Feb 1958. Contract (W-7405-eng-26). 32p. Order from LC. Mi $3.00, ph $6.30. CF-58-2-40

Comparison of gases for use as the coolant in a gas-cooled reactor, by G. Samuels. Oak Ridge National Lab., Oak Ridge, Tenn. Apr 1958. Contract (W-7405-eng-26). 12p. Order from LC. Mi $2.40, ph $3.30. CF-58-4-108

A prelinimary survey of some fluoride compounds, Part II , by L. A. Harris. Oak Ridge National Lab., Oak Ridge Tenn. May 1958. Contract (W-7405-eng-26). 3p. Order from LC. Mi $1.80, ph $1.80. CF-58-5-17

The uranium-bismuth system, by D. H. Abmann and R. R. Baldwin. Iowa State College. Ames, Iowa. Nov 1945. Decl. Feb 1957. Contract W-7405-eng-82. 19p. Order from LC. Mi $2.40, ph $3.30. CT-2961

Progress reports for November 1948, by R. H. Bailes. Dow Chemical Co. Great Western Div. Pittsburg, Calif. Dec 1948. Decl. Dec 1955. Contract AT-30-1-Gen-236. 14p. Order from LC. Mi $2.40, ph $3.30. DOW-9

Progress reports for November 1949, by R. H. Bailes. Dow Chemical Co. Great Western Div. Pittsburg, Calif. Nov 1949. Decl. Dec 1955. Contract AT-30-1-Gen-236. 69p. Order from LC. Mi $3.90, ph $10.80. DOW-21

Purification and concentration of uranium in river water using an ion exchange resin, by R. E. Shoaf and others. Goodyear Atomic Corp. Portsmouth, Ohio. May 1956. Contract AT(33-2)-1. 6p. Order from LC. Mi $1.80, ph $1.80. GAT-L-197

Potassium fluoborate production from boron trifluoride complexes containing methyborate, by George T. Miller and Arthur M. Teller. Hooker Electrochemical Co. Niagara Falls, N. Y. Mar 1958. Contract AT(30-1)-1524. 7p. Order from LC. Mi $1.80, ph $1.80. HEC-85

Degradation and passivation of elemental boron, by George T. Miller. Hooker Electrochemical Co. Niagara Falls, N. Y. Apr 1958. Contract AT(30-1)-1524. 9p. Order from LC. Mi $1.80, ph $1.80. HEC-88

Study and improvement of electrolytic boron process, by George T. Miller. Hooker Electrochemical Co. Niagara Falls, N. Y. May 1958. Contract AT-(30-1)-1542. 33p. Order from LC. Mi $3.00, ph $6.30. HEC-89

Evaluation of high Na_2O neutralization in activated silicon preparation. Final report-DT-105-558-E, by R. B. Richman. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. May 1956. Decl. with deletions Nov 1957. Contract W-31-109-Eng-52. 8p. Order from LC. Mi $1.80, ph $1.80. HW-43783 (Del.)

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Tentative specifications for 1) zirconium ingot, 2) zirconium strip, 3) uranium, 4) zirconium-base fuel alloy ingot and 5) zirconium-base fuel alloy strip for PWR seed fuel plates. Preliminary progress specifications for PWR seed fuel plates and fuel alloy componnents, by P. G. DeHuff. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pennsylvania. Feb 1956. Decl. with deletions Mar 1957. 24p. Order from LC. Mi $2.40, ph $3.30. WAPD-PWR-FE-1165(Del.)

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Outline of PWR alternate control. Material information obtained at Bettis. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pennsylvania. Mar 1957. 35p. Order from LC. Mi $3.00, ph $6.30. WAPD-PWR-PMM-699

Metallographic examination of zircaloy cladding from the CR-S-2 hot water loop test. Interim report No. 8, by F. O. Bingman, Jr. and L. J. Jones. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pennsylvania. Oct 1957. 7p. Order from LC. Mi $1.80, ph $1.80. WAPD-PWR-PMM-1516

Effect of nitrogen and carbon of the corrosion of zirconium in 600° F water, by B. Lustman. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pennsylvania. Jul 1950. Decl. Dec 1955. Contract AT-11-1-GEN-14. 16p. Order from LC. Mi $2.40, ph $3.30. WAPD-RM-17

Evaluation of tests for classification of zirconium for corrosion resistance, by D. M. Wroughton and others. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pennsylvania. Jan 1951.

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A method for tinning sponge zirconium, by H. R. Hoge. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pennsylvania. Dec 1952. Changed from Official Use Only Dec 1957. 20p. Order from LC. Mi $2.40, ph $3.30. WAPD-RM-163

The solid solubility of tin in alpha zirconium, by G. R. Speich and S. A. Kulin. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pennsylvania. Sep 1952. Contract AT-11-1-GEN-14. 24p. Order from LC. Mi $2.70, ph $4.80. WAPD-T-24

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Sliding friction of preferred bearing materials in pressurized water environments, by N. B. Dewees. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pennsylvania. Apr 1957. Project 90296. Contract (AT-11-1-GEN-14) and NObs 67500. 19p. Order from LC. Mi $2.40, ph $3.30. WAPD-T-550

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Zirconium highlights, April 1958. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pennsylvania. Contract AT-11-1-GEN-14. 22p. Order from LC. Mi $2.40, ph $3.30. WAPD-ZH-6

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